A Clinical Study On

VATHASTHAMBAM

(SCIATICA)

WITH THE EVALUATION OF SIDDHA DRUG

AYAKAANTHA CHENDHOORAM

The dissertation submitted by

Dr. KR. MUTHUMARI (Reg. No. 321411107)

Under the Guidance of

Prof. Dr. K. KANAKAVALLI, M.D(S)

Submitted to

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

In partial fulfillment of the requirements
For the award of the degree of

SIDDHA MARUTHUVA PERARIGNAR

DOCTOR OF MEDICINE (SIDDHA)

BRANCH I - MARUTHUVAM

POST GRADUATE DEPARTMENT OF MARUTHUVAM

THE GOVERNMENT SIDDHA MEDICAL COLLEGE

CHENNAI - 106

OCTOBER - 2017

CERTIFICATE

This is to certify that the dissertation entitled "**A CLINICAL STUDY ON VATHASTHAMBAM"** is a bonafide work done by **Dr.KR.MUTHUMARI**, Government Siddha Medical College, Chennai – 600 106 in partial fulfillment of the University rules and regulations for award of **SIDDHA MARUTHUVA PERARIGNAR** under my guidance and supervision during the academic year 2014– 2017.

Name & Signature of the Guide Name & Signature of the HOD

Name & Signature of the Dean/Principal

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CONTENTS

INTRODUCTION

Siddha system of medicine is the most primordial medical system. The medicines are prepared through various research works done by the Siddhars on herbs, minerals and animal sources. The uniqueness of Siddha system is that it does not consider treatment and prevention separately. It ultimately targets at the prevention of diseases.

In Siddha system, metals and minerals are widely used, when compared to other traditional medical systems. The basic principles of Siddha system are based on panchabootham, mukkutram.

Siddhars are noted not only for the intuitive way of diagnosis and treatment but also evolving new and efficacious formulae of preparation of medicine.

In addition to this Siddhars used Envagai thervugal for the diagnosis and treatment of the disease. It also aims at balancing the three humors and the maintenance of seven elements.

It is beyond their knowledge how it works. Saint Thiruvalluvar insists that diseases are caused due to the derangement of three humors which is quoted as.,

மிகினும் குறையினும் நோய் செய்யும் நூலோர்

வளி முதலா எண்ணிய மூன்று[1].

As per Yugi Vatha disease has been broadly classified into 80 different types, *vathasthambam* is one among them. It closely resembles to Sciatica in Modern aspects.

Sciatica is a medical condition characterized by pain affecting the back, hip and outer side of the leg, caused by compression of a spinal nerve root in the lower back, often owing to degeneration of an inter -vertebral disc. Depending on the nerve root involvement the degree of pain may extend to the foot or to the toes, usually affecting one side of the lower back.[2]

Sciatica is commonly affecting 15- 40 % of people during the life time. The incidence is related to the age and it is rarely seen before 20 years . The highest incidence is found in the 5th decade of life.[3] The disease is characterised by varying

pain widely from a mild ache to a sharp burning sensation or excruciating discomfort, sometimes it may be felt like an electric shock, weakness and numbness with difficulty in moving the leg or foot.[3]

Having completely convinced with the literary evidences available in Siddha medicine. I have choosen *vathasthambam* as my dissertation work which correlates with Sciatica as described in the modern medical system.

All materials in the nature including the human body as well as drugs are composed of five boothams.

The spiritual scientists were concentrated much of their time for the preparation of metallic and other powerful preparations so that their physical frame work may be preserved in good healthy condition.

In Siddha system, there exists 64 different types of medications -32 types of internal medicines and 32 types of external medications. Chendooram is one among the 32 types of internal medicines. *Ayakaantha chendooram* may be an effective as well as bio safe drug in the treatment of *vathasthambam*.

The unshakable belief among the people regarding the Vatha disease that it can be effectively managed only by Siddha medicine. This study is an initial step and only a preliminary attempt for further research.

AIM AND OBJECTIVE

Aim:

The purpose of this study is to evaluate the safety and efficacy of Siddha herbo-mineral formulation of *"AYAKAANTHA CHENDHOORAM*" in the treatment of *vathasthambam*.

Objectives:

- Collections of various Siddha literature of the study.
- Herbal Identification and authentication of the trial drug.
- To prepare the trial drug "*AYAKAANTHA CHENDHOORAM*" as per Standard Operative Procedures drug preparation.
- To evaluate the Biochemical & Physico-chemical analysis of the trial drug.
- To evaluate the safety profile like acute toxicity, sub acute toxicity of the trial drug in animal models as per OECD guidelines.
- To evaluate the pharmacological analysis of ANALGESIC ACTIVITY for my trial drug.
- To correlate the Siddha aspects of *VATHSATHAMBAM* to SCIATICA of Modern Medicine with aspect of aetiology, classification, pathology, prognosis and clinical features.
- To gather the Siddha diagnostic parameters by *Mukkutram, Udalthathukkal, Uyirthathukkal* and *Envagai thervugal.*
- To use modern parameters to confirm the diagnosis and prognosis of the disease.
- To make a clinical observation about the disease in relation of age, sex, occupation, social economic status, diet and family history.
- The haematological analysis, urine analysis, magnetic resonance imaging, radiological studies will be done to all patients.
- To find out the statistical analysis and efficacy of the trail drug through clinical study.

SIDDHA ASPECT

In Siddha system of medicine, the physiological function in human system is mediated by three substances viz, vatham, pitham, kabham. These three humors maintain the upkeep of the human body through their combined functioning. When deranged, they bring about diseases peculiar to their influence. In turn they vitiate other structural and functional elements of living body known as UdalThathus.

Vatham iyal

Definition:

Vatha is one of the Three humors. It consists of Vayu (air) and Aahaayam (sky),the two of five elements i.e PanchaBoodha.

The relation between Panchabootha and Uyir Thathukkal

- Aahaayam (space) + Vayu (air) - Vatha
- Thee (Fire) - Pitha
- Appu (water) + Prithivi (Earth) - Kabha

It would be incorrect to think of the three thathus only as the three dynamic elements manifesting in the body. Thesethathus are always supported by the two basic elements. Thus, Vayu and Aahaayam combine to become “Vatham” which controls all aspects of movements of the body. Inspite of this combination, however, “Vatham” seems to primarily display the characteristics of Vayu (air).

The words “dry, light, cold, quick, rough, minute and mobile” describes the characteristics of “Vatham”.

Theyu bootham is considered as the Pithathathu. This governs all the body’s conversion processes as well as its heat and energy producing capacities. “Pithathathu” is primarily characterised by the qualities of Theyu, which are hot, sharp, penetrating, light, acidic and slightly oily”.

“Appu” supported by “Prithivi” becomes “Kabhathathu” and controls liquefaction, lubrication & cohesion.It is also responsible for giving solidity and

structure to the body. “Kabha” thathu primarily reflects the qualities of the water, but also some traits of the earth elements, consequently, “Kabha” is heavy, slow, cold, solid and oily.

“வாதமாய் படைத்து பித்த வன்னியாய் காத்து– சேட்ப
சீதாமாய் துடைத்து.”(4)

- தேரன்

Vatham is a clinical condition characterized by pain, swelling, pricking and loss of function due to vitiated vatha which is the principal humor of the body.

Seats of vatham:

“நெளிந்திட்ட வாதமபா னத்தைப்பற்றி
நிறைந்திடை யைச் சேர்ந்துந்திக் கீழே நின்று
குளிந்திட்ட மூலமதூ டெழுந்து காமக்
கொடியிடையைப் பற்றியெழுங் குணத்தைப்பாரே”

“குணமான வெலும்பு மேற்றொக்கை நாடி
குழாமாகு மெழுபத்திராயித்தைச் சேர்ந்து
நிணமான பொருந்திடமும் ரோமக்காலும்
நிறைவாங்கி மாங்கிஷமெல்லாம் பறந்து
மணமான விந்து விழமலநீர் பெய்ய
வழிகாட்டிக் கால் நாட்டி வாதமெங்கும் கலந்து தானே.”(5)

“அறிந்திடும் வாத மடங்கு மலத்தினில்”

-திருமூலர்

Generally Vatha lives in,

Abaanan, Edakalai, Kamakodi, Undhiyinkeezhmoolam, Hip region, Bones Muscles, Nerves, Joints, Skin, Hair follicles and Stools.

Physiologically “Vadha” which has no alterations, lives in Gastro Intestinal Tract, Bones, Ear, Thigh,Hip and skin.

Functions of vatha:

"ஒழுங்குடன் தாதேழ்மூச் சோங்கி இயங்க
எழுச்சிபெற எப்பணியு மாற்ற எழுந்திரிய
வேகம் புலன்களுக்கு மேனச் சுறுசுறுப்பு
வாகளிக்கும் மாந்தர்க்கு வாயு".

-மருத்துவ தனிப்பாடல்.[6]

Giving Briskness

- Expiration & Inspiration
- Functioning of mind throughout body
- Regulation of 14 physiological reflexes (natural urges)
- Make the uniform functioning of 7 udalkattugal
- Protections and strengthening of 5 sensory organs.

Vatha kuttram:

Vatham measured ratio is one mathirai. This is the normal range. When there is deranged in their ratio called as kuttram which indicates the Vatha disease (vathanoi).

Aetiology of vatha disease (noi varum vazhi):

According to *yugi vaidhya chinthamani*,

"என்னவே வாதம்தா ணென்பதாகும்
இகத்திலே மனிதர்களுக் கெய்யுமாறு
பின்னவே பெண்தனையே சோரஞ் செய்து
பெரியோர்கள் பிராமணரை தூணித்தும்
வன்னவேவச் சொத்திற் சோரஞ் செய்து
காயத்திற் கலந்திடுமே வாதந்தானே

தானென்றகசப் போடு துவர்ப் புறைப்பு
சாதகமாய் மிஞ்சுகிலுந் சமைத்த வன்னம்
ஆனென்ற வாறினது பொசித்த லாலும்
ஆகாயத் தேறலது குடித்தலாலும்
பானென்ற பகலுறக்கமிரா விழிப்பு

பட்டினியே மிகவுறுதல் பாரமெய்தல்
சீக்கிரமாய் வாதமது செனிக்கு ந்தானே".[7]

- Excessive sexual indulgence.
- Unholy activities like stealing properties of the siva temple.
- Insulting parent's teachers and laureates.
- Over consumption of bitters, astringents, savories and rancid foods.
- Drinking rain water.
- Day time sleep
- Night time work
- Starvation
- Lifting over weight

According to *Pararasa sekaram*,

"தொழில்பெறுகைப் புக்கார்த்தல் துவர்த்தல்விஞ்சுகினுஞ் சோறும்
பழையதாகும் வரகுமற்றைப் பைந்தினைய ருந்திநாலும்
எழில்பெறப் பகலுறங்கி இரவினினுறங் காதாலும்
மழைநிகர் குழலினாளே வாதங்கோபிக் குங்காணே."[8]

- Will initiate and aggravate the vali. Over consumption of bitters, astringents savories and rancid foods
- Intake of cold food
- Day time sleep & night time work.

"காணவே மிகவுண்டாலுங் கருதுபட்டினி விட்டாலும்
மானனையார் கண்மோக மறக்கினு மிகுத்திட்டாலும்
ஆணவ மலங்கடம் மையங்ஙனே விடாததாலும்
வாறுதன்மட நல்லாளே வாதங்கோபிக்கு ங்காணே'."[9]

- Fasting
- Excessive sexual indulgence.
- Excessive amount of food

“பாரினில் பயப்பட்டாலும் பலருடன் கோபித்தாலும்
காரெனக் கருகியோடிக் கழுமரத்து ரத்தினாலும்
ஏற்பெறுதனது நெஞ்சின் மிகத்துக்கமடைந் திட்டாலும்
பாரிய காற்றினாளும் படரினும்வாதங் காணும்’’.(10)

- Fear
- Anger
- Worry

According to *Agathiyar kanmakaandam*,

“நூலென்ற வாதம் வந்தவகை தானேது
நுண்மையாய்க் கன்மத்தின் வகையை கேளு
காலிலே தோன்றியது கடுப்பதேது
கைகாலிலே முடக்கியது வீக்கமது’’.
கோலிலே படுக்கின்ற விருட்சமான
குழந்தை மரந்தனை வெட்டிமேல் தோசீவல்
நானிலே சீவசெந்து கால் முறித்தல்
நல்லகொம்பு தலைமுறித்தல் நலித்தல்காணே”.(11)

- Removing the bark of living trees
- Breaking the legs of animals
- Cutting the trees and living branches and removing leaves will aggravate vali.

According to *Agathiyar kunavaagadam*,

“அறுகுமடா மாமிசத்தின் வியாதியாலும்
அப்பனே சூதகத்தின் வியாதியாலும்
குணமில்லா இரசம்வங்கம் தின்னலாலும்
குடிகெடுத்த வாதமது உண்டாமப்பா’’.(12)

- Muscular disease
- Menorrhagia
- Consumption improper preparation of metallic compounds like Mercury and Lead.

Characteristic features of the vatha disease:

"வாதவீறு அன்ன மிறங்காது கடுப்புண்டாம் வண்ணமுண்டாம்
மோது கட்டுரோகம் சுரமுண்டா மிருமலுமா முறங்காதென்றும்
ஓது சூரிய வாதமனலாகு நடுக்கமுண்டாம் பொருள் களாய்ந்
தீதெனவே நரம்பிசித்து சந்துகள் தோறும் கடுக்குந் தினமுந்தானே"(13)

- Loss of appetite
- Pain & redness
- Fever & cough
- Insomnia
- Shivering
- Hyper pyrexia

"சந்திர வாதமுடம்பு குளிர்த் தெழுந்தே நடுக்குங் சீதவாய்வாம்
முந்திய குத்திசிவாஞ் சந்துகள் தோறுங் குடைந்து மொளிகள்
-வீங்கும்
வந்திய தொந்தவாதம் நரம்புகளெல்லா மிசித்து வலம் விடாது
அந்து அவ்வாகு வாதம் வீக்கமுண்டா முடற்றிமி ருண்டாமே"(14)

- Rigor and spasm
- Pain & tenderness of joints
- Swelling of joints
- Chillness of the body

According to *Theraiyar vakadam*,

"தக்கவாயுகோபித்தால்சந்துவுளைந்துதலைநோவாந்
மிக்கமுர்கொட்டாவிவிட்டங்கெரியுமலங்கட்டும்
ஒக்கநரம்புதான்முடங்குமூலர்ந்துவாய்நீரூறிவரும்
மிக்ககுளிரும்நடுக்கமாம்மேனிகுன்றிவருங்காணே"(15)

- Vitiation of Vatham causes pain in the joints
- Head ache
- Excessive yawning, burning sensation of the body

- Constipation
- Paralysis
- Excessive salivation
- Chillness
- Tremor

According to *Thirumandiram,*

"அறியஇம் மூன்றின்தன்மை சொன்னார் எனநந்தி
எரிஅனல் வாதம் எரிக்கும்குணம் கேளு
குறிஎனக் கைகால் குளைச்சு விலாச்சந்து
பறிஎன நொந்துடல் பச்சைபுண் ஆகுமே
புண்ணாய் வலிக்கும் பொருமும் குடல்ஓடித்
தண்ணாமலம் அதனைத் தம்பிக்கும் போக்காது
ஒண்ணா அசனம் உறவே கருக்கிடும்
பன்னார்குளிர்- சீதம் பகுத்திடும் வாதமே"(16)

- Pain all over the body
- Gastritis
- Constipation
- Loss of appetite

According to *Pathinen siddhar naadi nool*

"வாதத்தின்குணமேதென்னில்வயிறதுபொருமிக்கொள்ளும்
தாபிதத்தில்மேனிகைகால்சந்துமேகடுப்புத்தோன்றும்
தீதுற்றுசீறுநீர்தாதுத்தெறித்துடன்கடுத்துவீழும்
மோதுத்தவாதமென்றுபுகன்றனர்முனிவர்தாமே"(17)

- Gastritis
- Inflammation in the joints of all over the body
- Pain in the joints of upper and lower extremities
- Dysuria.

***Vathasthambam* :**

Vathasthambam is one among the eighty (80) types of vatha disease described by the great siddhar Yugi Munivar in the textbook of YugiVaithyaChinthamani.

Vathasthambam iyal:

"உற்பவிக்கும் வாதமது எழுந்து பொங்கி
உயர்காலின் புறவடியைக் குடைந்து பற்றி
தெற்பவிக்கும் வீக்கமாய்ச் செழும்ப லுண்டாய்த்
தேகமெங்கும் நோவாகி திமிரு மாகி
விற்பவிக்கும் வில்லுபோல் விதன மாகி
மிடுக்கான மாந்தனைப்போல் விதனமாகிப்
பற்பவிக்கும் பரன்றனையே நினையா மூடர்
படுகின்ற வாதஸ்தம் பமுமாம் பாரே" (18)

-யூகி

- Pain in the back or leg
- Tingling pain in leg
- Burning sensation down the leg
- calf muscle weakness
- Numbness in the leg or foot
- Weakness in the foot and toe muscles
- Tiredness

According to *T.V.Sambasivam pillai dictionary*:

வாததம்பம்:

வாதம் கதித்து காலின் புறவடியைப் பற்றி குடைச்சலும் வீக்கமுண்டாய் உடம்பெங்கும் வலி திமிர் முதலியவை உண்டாக்கும் ஓர் வகை வாதநோய்.

A kind of rheumatic pain caused by aggravated wind humor marked by boring pain, swelling in the legs accompanied by numbness.(19)

Siddha mode of pathology:

Vali said to be the phenomena responsible for the movements of the parts involved in the motor system, hence it is responsible for the articulation of the joints.

Santhiga Iyam is said to be phenomena responsible for the normal maintenance of the synovial fluid. Synovial fluid provides nutrition for articular cartilages, disc and menisci there by avoids friction and erosion of the bone.

When the seven Udarkattugal and Mukkutram are in equilibrium a normal structural and physiological state of the body is ensured. As the Udarkattugal are affected by the extrinsic and intrinsic causative factors there will be deterioration in the structural and functional status of the body. When the causative factors take hold of Udarkattugal separately or in combined form it result in co-ordination of functions there by the disease manifest and expose its clinical features.

In vathasthambam due to factors related to diet, habit, environment etc adversely influence Vali and Azhal mainly in Mukkutram.

The involvement of Vyanavayu and Abanavayu plays a prime role in the manifestation of signs & symptoms. Vyanan is responsible for all the motor and sensory function of the body and the nutrition of tissues.

Abanan is responsible for the assimilation of the nutritional factors from the gastro intestinal tract distribution between various thathus and expulsion of waste product through feces, urination etc.

The Azhal is responsible for the healthy maintenance of every tissue of the body and its variation results in inflammatory changes in the bone and other accessory structures like tendons, cartilages and synovial membrane which helps in perfect articulation of the joints.

The deterioration of the two main kutram may also accompany Iyakutram. The deterioration of Iyakutram leads to structural changes in the bones and the fluids in the joints which are mainly controlled by the factors of Santhigam.

Disturbances in Mukkutram produce different clinical manifestations. They are include swelling of the joints, pain, stiffness and restriction of movements due to disturbed Vali.

Inflammatory changes of the joints like redness hyperemia and warmness due to disturbed Azhal and erosion of bone margin, increased synovial fluids due to disturbed Iyam.

The Mukkutra phenomena and the functioning of the joints :

"வளிமிகுவபானவியானவாயுக்களதிகரிக்கும்
இளமிகுமலநீர்க்கட்டும்இயம்பியவபானன்செய்யும்
வளிவிலாவியானன்கீலின்விளங்குறுபுழைகபோறும்
ஓளியுறுகுற்றமெல்லாமொன்றிலென்றுலவச்செய்யும்".[20]

Piniyari muraimai (diagnosis) :

The methodology of diagnosing in Siddha science is very unique and solely based on the clinical acumen of the physician. It is based on the three main principles,

- Poriyaltherthal
- Pulanaltherthal
- Vinathal

1. Poriyaltherthal:

Pori means sense of perception.Poriyaltherthal understands by five sense organs such as nose, tougue, eyes, skin and ear.

2. Pulanaltherthal:

Pulan means objects of senses. Pulanaltherthal understands by the sense objects Smell (manam), Taste (suvai), Vision (oli), Somatic sense (oouru), Sound (oosai).

In both of the above said methods, physicians pori and pulan are used as tools for examine the pori and pulan of the patients.

3.Vinathal:

Vinathal is the process of obtaining the detailed history of the disease by interrogation of the patient. By gathering the history of the disease, complaints, duration, personal history, family history, clinical features, where an accurate history, is available, a disease can be easily diagnosed ever before clinical examinations are carried out. It is the focal point of the physician- patient relationship and established the bonding necessary for patient cure

The classified method of clinical examination is known as Envagai thervu,

"நாடிப்பரிசம் நாநிறம் மொழிவிழி
மலம் மூத்திரமிவை மருத்துவராயுதம்"

-தேரன்.[21]

"மெய்குறி, நிறம்த்தொனி விழிநாஇருமலம் கைக்குறி".[22]

-தேரையர் வாக்கு.

"தொகுகலுற்று அட்டவிதப் பரிட்சை தன்னை
துலக்கமுறும் பண்டிதலே தெளிவதாகப்
பகுக்கரிய நாடியை நீ பிடித்துப் பாரு
பகர்கின்ற வார்த்தை பார் நாவைபாரு
வகுக்கரிய தேகமெனத் தொட்டுப்பாரு
வளமான சரீரத்தின் நிறத்தைப்பாரு
சகிக்கரிய மலத்தைப்பார் சலத்தை பாரு
சார்ந்த விழிதனைப் பார்த்து தெளிவாய் காணே".[23]

Nowadays advanced diagnostic tools have been developed by modern bio medical scientists. But Siddhars have given eight diagnostic methodological tools. They are called as Envagai Thervu.

Eight fold system of clinical assessments:

Siddhars have given eight diagnostic methodological tools. They are

1. Naadi
2. Sparisam
3. Naa
4. Niram
5. Mozhi
6. Vizhi
7. Malam
8. Moothiram

General findings:

Naadi:

Naadi is responsible for the existence of life, can be felt one inch below the wrist on the radial side by means of palpation with tips of index, middle and ring finger, corresponding to vatham, pitham, kabham.

The three uyirthathukkal are formed by the combination of

Edakalai	+	Abanan	=	Vali (Vatham)
Pinkalai	+	Piranan	=	Azhal (Pitham)
Suzhumunai	+	Samanan	=	Iyam (Kapham)

Three humorsVatham, Pitham, and Kapham are in the ratio 1:1/2:1/4 normally. Derangement in these ratio leads to various disease conditions. [24]

Naadi nadai in vathasthambam :

Following types of Naadi are seen commonly.

1. Vathakapham
2. Kaphavatham

வாதகபம்**:**

“பாங்கான வாதத்தில் சேத்துமநாடி
பரிசித்தாற் திமிர்மேவு முளைச்சலாகுந்
தீங்கான யிருமலுடன் சன்னிதோடஞ்
சேர்ந்தவிடம் வெடிசூலை யிருத்துரோகம்
வாங்காத யீளை மந்தாரகாசம்
வலியுடனே புறவீச்சுகள் உள்வீச்சுவீக்கம்
ஆங்காணும் சுரமுடனே சுவாசகாசம்
உண்டாகும் வெகுநோய்க் குமுறுதிதானே”.[25]

கபவாதம்:

“கண்டாயோ சிலேற்பனத்தில் வாதநாடி
கலந்திடுகில் வயிறுபொருமல் கனத்தவீக்கம்

உண்டாலோ ஓங்காரஞ்சத்தி விக்கல்
உறுதிரட்சை வாய்வுவலி சன்னிதோடம்
விண்டாலேயிளைப் பிருமற்சோகை பாண்டு
விடபாகம் விடசூலை பக்கவாதந்
திண்டாடும் நாசிகா பீடகங்கள்
சிரநோய்கள் பலதும்வந்து சிறக்குந்தானே."[26]

Sparisam (Touch, palpation):

By sparisam, the temperature of skin (thatpam- cold or veppam – heat), smoothness, roughness, sweating, dryness, hard patches, swelling, abnormal growth of organs and tenderness can be felt.

In case of vathsthambam pain, tenderness,swelling,can be noted.

Naa (tongue examination):

Signs and symptoms in the tongue are noted here. Colour, salivary secretion, ulcers, coating, inflammation, taste changes, deviation and its nature are generally noted.

In naa no characteristic changes in vathasthambam.

Niram (colour examination):

The Colour of the skin all over the body and local region of affected should be observed.

Mozhi (voice)

Character of the speech is noted, mainly uraththaoli (high pitched), thazhndhaoli (low pitched), or the sound resembles any instrument.

Vizhi (examination of eyes):

Colour, character, vision (both field of vision and colours identifiable) and lacrimation should be observed.

Malam (stool examination):

Quantity, colour, smell, froth should be observed.

Constipation is noted in some cases in vathasthambam.

Moothiram (urine analysis):

“அருந்துமாறிரதமும்அவிரோதமதாய்
அஃகல்அலர்தல்அகாலவூண்தவிர்ந்தழற்
குற்றளவருத்திஉறங்கிவைகறை
ஆடிக்கலசத்தாவியகாதுபெய்
தொருமுகூர்த்தக்கலைக்குட்படுநீரின்
நிறக்குறிநெய்க்குறிநிருமித்தல்கடனே”.(27).

- தேரன்

Prior to the day of urine analysis, the patients were advised to take a balanced diet and good sleep. Urine for examination should be collected in the early morning after the patient gets up from the bed.

The first flow of urine is discarded because it may contain extraneous materials. The middle flow is then collected in a glass vessel. The examination involves in two stages such as Neerkuri and neikuri within one and half an hour (3 ¾ Naazhigai).

If the patients is serious in condition urine may be collected at any time.

Neerkuri:

“வந்த நீர்க்கரி எடை மணம் நுரை எஞ்சலெ
றைந்தியலுளவவை யறைகுது முறையே”(28)

-தேரன்

.General features of urine explained in Siddha texts are,

1. Niram - colour of urine
2. Edai - specific gravity of urine
3. Manam- odour of urine
4. Nurai - frothy nature of urine
5. Enjal - sediments of urine

Neikuri:

A drop of Gingely oil is dropped on a vessel containing urine to be tested and kept in the sunlight and left undisturbed. The nature of Neikuri is noted by observing the spreading of the oil in urine.

1. Vathaneer – The oil spreads like snake
2. Pithaneer – The oil spreads like ring
3. Kabhaneer – The oil spreads like pearl
4. If the oil spreads gradually, it indicates good prognosis [29]
5. If the oil spreads fast or gets mixed completely with urine or sinks in urine, it suggests bad prognosis.
6. Thonthaneer – Snake in the ring, ring in the snake, snake in the pearl and ring in the pearl.

In vathasthambam, Neikuri spreads like a snake and resembles like a pearl.

Besides Envagai Thervugaal, a disease can also be diagnosed by Thinaigal, Paruvakalangal, Uyirthathukkal, Udalthathukkal and Poripulangal combinations of all these diagnostic criteria are helpful to attain a proper diagnosis with complete entity based on principles of the Siddha science.

Thinai (land):

Siddhars classified the lands into five types.

They are :

1. Kurunji – Mountain range
2. Mullai – Pastoral area of the forest
3. Marudham – The fertile river bed
4. Neidhal – The coastal region
5. Paalai – Arid desert

Kabha diseases will occur in Kurinji land. Pitha diseases occur in Mullai land. Vadha diseases occur in Neidhal land. Staying in Paalai land is not good to health.

Marudham land is the fertile area where no disease occurs. So, Marudham land is the best one to stay in.

The winter season gives good health to the man, early summer and later rainy gives moderate health. Whereas early rainy and later summer are more prone to diseases, that's why Siddhars called it as Aanaga kaalam.[30]

Relation between mukkutram, kaalangal and thinaigal:

Mukkutram	**Paruvakaalam (Seasons)**			**Thinai**
	Thannilai valarchi (Accumulation)	**Vaetrunilai valarchi (Aggravation)**	**Thannilai adaidhal (Alleviation)**	
VATHAM	Mudhuvenil kaalam	Kaar kaalam	Koothir kaalam	Vatha disease is more prevalent in Neidhal land
PITHAM	Kaarkaalam	Koothir kaalam	Munpani kaalam	Pitha disease is more prevalent in Mullai land
KABHAM	Pinpanikaalam	Elavenil kaalam	Mudhuvenil kaalam[31]	Kabha disease is more prevalent in Kurunji land

Paruvakalam (Seasonal effects):

Siddhars have classified a year into six seasons each constituting two months. There are some disease which are more prevalent during a particular Paruvakalam and study of it will be of much useful for diagnosis.

S.no	Perum pozhuthukal	Synonym	Mukkutra verupaukal	Suvai
1	Kaarkaalam (Aavani & Purattasi) Mid August to Mid October	Early rainy	Vatham vaetrunilai valarchi, Pitham thannilai valarchi	Inippu Pulippu Uppu
2	Koothirkaalam (Iypasi & Karthigai) Mid October to Mid December	Late rainy Autumn	Vatham thannilai adaithal, Pitham vaetrunilai valarchi	Inippu Kaippu Thuvarppu
3	Munpanikaalam (Margazhi & Thai) Mid December to Mid February	Early dew Winter I part	Pitham thannilai adaithal	Inippu Pulippu Uppu
4	Pinpanikaalam (Masi & Panguni) Mid February to Mid June	Late dew Winter II part	Kabam thannilai valarchi	Inippu Pulippu Thuvarppu
5	Elavenirkaalam (Chithirai & Vaikaasi) Mid April to Mid June	Early summer	Kabam vaetrunilai valarchi	Kaippu Karppu Thuvarppu
6	Mudhuvenirkaalam (Aani & Aadi) Mid June to Mid August	Late summer	Vatham thannilai valarchi, Kabam thannilai adaithal	Inippu

In case of *Vathasthambam* the prevalence of the disease in Kaarkaalam due to the vaetrunilaivalarchi of vali.

Udal vanmai (Immunity):

Siddhars classify udalvanmai into three types. They are

1. Iyarkaivanmai
2. Kala vanmai
3. Seyarkaivanmai

Iyarkaivanmai:

One can inherit his immunity by birth naturally.

Seyarkaivanmai:

One can acquire his immunity through various food, activities and medicines.

Kaalavanmai:

One can inherit his immunity at different age and different seasons (paruvakkalam).

Uyir thathukkal / mukkutram:

The theory mukkutram forms the foundation of siddha. The primary position is related to the equilibrated state of mukkutram. This definition indicates their importance in the maintenance of health. It can also be summarized that any disturbance in that equilibrated state leads to the development of disease in the body.

They are

1. Vali
2. Azhal
3. Iyam

Vali or Vayu:

Vali is not mere wind, but also that which causes motion, energy and sensation of every cell in the body. Vayu relates to the nerve force. It is responsible for all movements in the mind and the body. In western terms, it is electricity setting the organism into motion, maintaining the equilibrium between Azhal and Iyam.

In human body the locomotor activity function through voluntary muscles and its activities controlled by nerves system called kanmendriyam, likewise the sensation and its activities are known as Gnanendriyam. These types of activities are governed by valikutram among the mukkutram.

The nerve cells are also governed by vali (vatha) kutram. During stimulation the nerve cells become repolarized and depolarized into positive and negative charged waves by the help of dhasavayus. This conducts the signals and information from one part to another.

Seats of vali:

Below the navel region (umbilicus)

Urinary bladder, motion, spermatic cord, umbilical cord, thigh, bone, skin, nerves, joints, muscles, hair follicles, pelvis and ear. (33)

Qualities of vatham:

Own attribues:

"வாதங் கடுமை வறட்சியுடன் நொய்மை
சீதமுஞ் சலனம் சிதறணுவு ஏதமுட
னிக்குணத் தோடுற்றே யியக்கந் தருமளவிற்
தக்க பரிகாரந் தா."(34)

- Roughness
- Dryness
- Lightness
- Coolness
- Mobility
- Subtlety

Opposite attributes,

"வாதகுண மாறுக்கும் மாறுகுணமே னோக்கின்
ஒதமிரு தீரம் உயிர்பாரம்--பேராதரவா
யுள்ள தீயோ டுறதியிற்றுத் திரளாக
உள்ள குணத்தையே ஊட்டு."(35)

- Softness
- Heaviness
- Hot
- Stable
- Soli

Varieties of vatham:

Vatham is classified into 10 types,

"முறையாம்பிராணனோடபானன்வியானன்
மூர்க்கமாய்முதானனொடுசமானனாகும்
திறமையாங்கூர்மனொடுகிருகரன்ரான்
தேவதத்தனோடுதன்ஞ்செயனுமாகும்".[36]

S. No	Types of Vatham	General Features	Changes in vathasthambam
1	Piranan (Uyirkkaal)	Responsible for respiration and it is necessary for proper digestion.	Normal
2	Abanan (Keel nokkukkaal)	Responsible for all the downward forces such as voiding of urine, stools, semen, menstrual flow.	Affected (constipation, menstrual disturbances)
3	Viyanan (Paravukaal)	Dwells in the skin and is concerned with the sense of touch, extension and flexion of the parts of the body and distribution of the nutrients to various parts of the body.	Affected pain and tenderness over the affected areas.
4	Uthanan (Mel nokkukaal)	Responsible for all kinds of upward motion such as nausea, vomiting etc.,	Normal
5	Samanan (Nadukkaal)	Considered essential for proper digestion, assimilation and carries the digested nutrients to each and every organ.	Affected due to other Vayus are affected.
6	Nagan	Helps in opening and closing of eyelids.	Normal
7	Koorman	Responsible for vision, lacrimation and yawning.	Affected (disturbances of vision)

8	Kirugaran	Induces appetite, salivation, all secretions in the body including nasal secretion and sneezing.	Affected (loss of appetite)
9	Thevathaththan	Induces and stimulates a person to become alert, get anger, to quarrel, to sleep etc.,	Normal
10	Dhananjeyan	Resides in the cranium and produces bloating of the body after death. This leaves from the body after 3 days of death, forming a way through the skull[37].	Normal

Azhal:

This is nothing but the characteristics of fire such as burning, boiling and heating etc. it corresponds to the functions of thermogenesis production of heat necessary to maintain the integrity of the human circulatory systems. Azhal is classified into 5 types. It mainly governs enzymes and hormones.

Seats of azhal:

Between heart & the naval.

Sweat, lymph, blood, stomach, urinary bladder, saliva, eye and the skin.

Varieties of azhal:

S.No	**Types of Azhal**	**General Features**	**Changes in vathasthambam**
1	Analagam	Peps up the appetite and aids in digestion.	Loss of appetite
2	Ranjagam	Responsible for the colour and contents of blood.	Anaemia
3	Saathagam	Controls the whole body and is held responsible for fulfilling a purpose.	Unable to carry out regular works

4	Pirasagam	Dwells in the skin and concerned with the shine, glow, texture and its complexion.	Normal
5	Alosagam	Responsible for the perception of vision[38].	Normal

Iyam:

It imparts moisture.

Seats of Iyam:

Above the heart, stomach, fat, sperm, tongue, uvula, bone marrow, blood, nose, nerves, bones, large intestine, eyes and joints

Varieties of Iyam:

S.No	**IYAM**	**General Features**	**Changes in vathasthambam**
1	Avalambagam	Lies in the respiratory organs, exercises authority over other kabhas and control the heart and circulatory system.	Normal
2	Kilethagam	Found in stomach as it seat, moistens the food, softens and helps to be digested.	Loss of appetite
3	Pothagam	Responsible for the perception of taste	Normal
4	Tharpagam	Presents in the head and is responsible for the coolness of the eyes, sometimes may be referred to as cerebrospinal fluid.	Normal
5	Santhigam	Necessary for the lubrication and the free movements of joints[39]	Restricted movements

Udal kattugal (Seven Physical Constituents):

S.NO	UDAL KATTUGAL	GENERAL FEATURES	CHANGES IN VATHASTHAMBAM
1	Saaram (Digestive essence)	Responsible for the growth and development. It keeps the individual in good temperament and it enriches the body.	Affected (pain)
2	Senneer (Blood)	Responsible for the color of the blood and for the intellect, nourishment, strength of the body.	Affected (anaemia)
3	Oon (Muscle)	Gives lookable contour to the body as needed for the physical activity. It feed the fat next day and gives a sort of plumpness to the body.	Affected (swelling)
4	Kozhuppu (Fat)	Lubricates the organs to facilitate frictionless functions.	Affected (restricted movements)
5	Enbu (Bones)	Supports and protects the vital organs, gives the definite structure of the body and responsible for the posture and movements of the body.	Affected (degenerative changes)

6	Moolai (Bone marrow)	Nourishes the bone marrow and brain which is the center that controls other system of body.	Normal
7	Sukkilam/Suronitham (Sperm/Ova)	Responsible for reproduction.[40]	Normal

Gnanendhriyam:

Mei - Feel all types of sensation
Vai - For identifying taste
Kan - Meant for vision
Mooku - For identifying the smell
Sevi - For hearing

In case of *Vathasthambam:*

Mei - Pain and tenderness hip and lower limbs.

Kanmendhriyam:

Kai - Majority of normal works done by hands
Kaal - For working
Vai - For speaking
Eruvai - For defecation
Karuvai - For reproduction

In case of *Vathasthambam:*

Kai - Difficulty to use
Kal - Difficulty to use
Eruvai - Constipation in some cases
Karuvai - Irregular menstrual cycles in some cases

Maruthuvam (line of treatment):

Siddha system of medicine is an unique system of medicine in which treatment is given both for the body and mind.

Thiruvalluvar in his Thirukkural under the heading MARUNDHU mentions about the diet, disease and its prevention.

They are,

மருந்தென வேண்டாவாம் யாக்கைக்கு அருந்தியது
அற்றது போற்றி உணின்.(41)

அற்றா லளவறிந்து உண்க வஃதுடம்பு
பெற்றா னெடிதுய்க்கு மாறு.(42)

தீயள வன்றித் தெரியான் பெரிதுண்ணின்
நோயள வின்றிப் படும்.(43)

மாறுபா டில்லாத உண்டி மறுத்துண்ண
னூறுபாடு டில்லை உயிர்க்கு.(44)

இழிவறிந் துண்பாங்க ணின்பம்போ னிற்கும்
கழிபே ரிரையான்க ணோய்.(45)

So in siddha system, treatment is not only for removal of the disease, but for prevention and improving the body condition which called as Rejuvenation.

The entire siddha system of medicine consists of three great subdivisions namely,

1. Noyillaneri (preventive) – Kaappu
2. Noineekuneri (Treatment) – Neekkam
3. Uramaakkumurai (Restoration) - Niraippu

Noyilla neri (preventive):

Noyillaneri is the special approach of the siddha system where regular dietary habits, early rising, physical and mental disciplinarians are all emphasized. Prevention can mostly save our body and soul, but modernization results in alteration of good health, leads to disease.

Noineeku neri (Treatment):

A good physician should know about the derangement of kutram and should treat the patient on the basis of altered kutram.

Treatment is based on

1. To bring the Tridosham to normal
2. To treat the disease according to its symptoms through medicines.
3. To increase the natural immunity.

To normalize Tridosham

"விரேசனத்தால்வாதம்தாழும்
வமனத்தால்பித்தம்தாழும்
நசியஅஞ்சனத்தால்கபம்தாழும்."[46]

Vatha disease can be brought down by viraesanam, by giving laxatives and purgatives according to the patient condition.

Four requisites of successful treatment are explained by thiruvalluvar

"உற்றவன் தீர்ப்பான் மருந்துழைச் செல்வானென்
றப்பனாற் கூற்றே மருந்து".[47]

-திருவள்ளுவர்

It is also said in Theraiyar venba as,

"நோயாளி பண்டித னந்நோய்க்கு மருந்திடைய
னேயானநால்வரிடமாகும் – தூயமருந்
திங்குணமென்றாதியியம்பினாராகமத்தின்
நற்குணமாயோதுகிறேன்நான்"[48]

-தேரன்

They are the patient, the attendant, physician and medicine.

Management:

Since *Vathasthambam* is one of the vatha disease.so,

"விரேசனத்தால் வாதம் தாழும்"

According to Siddha literature vitiated Vatha may be suppressed by giving purgatives.

For purgation:-

Agathiyarkuzhambu– with Inji saaru

After rearrangement of doshas:

Ayakaantha chendhooram-130 mg 2 times/day with Chukku powder

Anupanam:

"அனுபானத் தாலே யவிழ்தங்கட காண்மை
கனமாகு மென்மை யெல்லாம் காட்டும் –இனமான
பேதாபே தங்களெல்லாம் பேதித் தறிந்தவரே
நாதாக்க ளென்னுமறை நூல்"

- தேரன்.(50)

Anupanam is commonly known as "THUNAI MARUNTHU" in tamil. In Siddha system of medicine the adjuvant is one of the important drug therapy.

Pathiyam:

During the case of treatment, the patient regarding diet is advised to take following items and physical activities. This form of medical advice in siddha system is termed as pathiyam which is very important in siddha system of medicine.Pathiyam means both pathiyapatharthas and apathiyapatharthas.

"பத்தியம்போனாற்பலன்போமருந்துகளுக்
கத்தியினினோய்களணுகுமே – பத்திங்கள்
உண்டானாலுண்டாமுறிதியவிழ்தங்கட்
கெண்டானுமுண்மையிதையே".

-தேரன்.(51)

In Patharthagunachinthamani, following diets are advised to vatha patients,

Do's

செங்கழுநீர்கோட்டந்தேன்மிளகுநல்லெண்ணெய்
தங்குபெருங்காயந்தழுதாழையெங்கெங்குங்
கூடுசிறுமுத்துநெய்கோழிவழந்திவைகள்
வாருமனிலத்தைமதி.(52)

Chenkazhuneer, honey, pepper, sesame oil, asafoetida, castor oil, black gram.

Dont's

”இலவணம்புளிகடுவெண்ணாலுமுதலாக
வொவொருகுணமாயொழிவாய் – நவிலிறைச்சி
கூழ்ப்பாண்டமச்சம்பெண்கோத்திரங்கொள்பிரமபத்ரி
தீழ்ப்பாகுமெத்தவீதுசீ”.

-தேரன்.[53]

According to the above version salt, tamarind, mustard, bottle gourd, fish, smoking are should be avoided.

Niraivu (Restoration):

- Reassurance is given to all patients for recovery.
- Advised to lead a stress free and strain less life.
- Not to be anxious.
- Not to be depressive.
- Avoid excessive workload.
- Avoid exposure to cold.
- Avoid tobacco chewing and snuff.

MODERN ASPECT

SCIATICA

Sciatica is a medical condition characterized by pain affecting the back, hip and outer side of the leg, caused by compression of a spinal nerve root in the lower back, often owing to degeneration of an inter -vertebral disc. Depending on the nerve root involvement the degree of pain may extend to the foot or to the toes, usually affecting one side of the lower back.

Sciatica is relatively common affecting 15- 40% of people during the life time. The incidence is related to the age, rare before 20 years old. The highest incidence is found in the 5^{th} decade of life. The disease is characterized by varying pain widely from a mild ache to a sharp burning sensation or excruciating discomfort, sometimes it may be felt like an electric shock, weakness and numbness with difficulty in moving the leg or foot.[54]

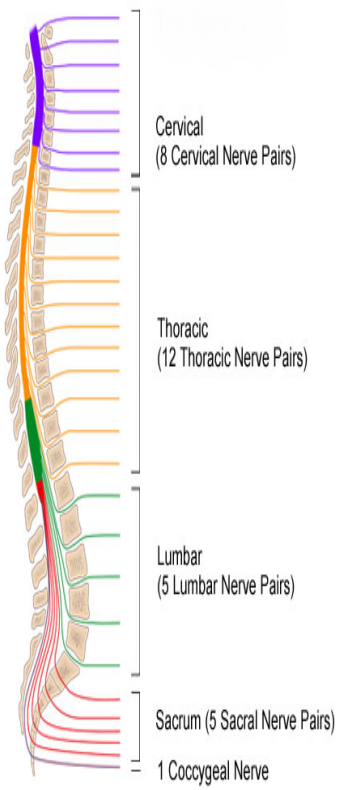
SPINAL CORD

The spinal cord is the long cylindrical lowest part of central nervous system. It occupies upper two- thirds of vertebral canal. It gives rise to 31 pairs of spinal nerves.

Extent: It extends from upper border of atlas vertebra to the lower border of first lumbar or upper border of second lumbar vertebra in an adult. Superiorly, it is continuous with the medulla Oblongata, inferiorly it terminates as conus medullaris.

The spine is the segmental column of vertebral that constitutes the major sub - cranial part of the axial skeleton. Its individual elements are united by a series of inter vertebral articulation to form a firm but flexible shaft that supports the trunk and its appendages while providing a protective covering for the spinal cord. The entire column typically consists of 33 vertebrae. 7 cervical, 12 thoracic and 5 lumbar vertebrae compose the movable presacral section of the spine, while 5 fused elements form the inflexible sacrum that articulates with the pelvic girdle. Cardal to the sacrum 4 or 5 irregular ossicles make up coccyx.

As the spinal cord is much shorter than the length of the vertebral canal.



ANATOMY OF LUMBAR VERTEBRAE:

The lumbar vertebrae, numbered L1-L5, have a vertical height that is less than their horizontal diameter. They are composed of the following 3 functional parts:

The vertebral body, designed to bear weight.

The vertebral (neural) arch, designed to protect the neural element.

- The bony processes (spinous and transverse), which function to increase the efficiency of muscle action.

Vertebral Body:

The body is large, wider from side to side than from before backward, and a little thicker in front than behind.The lumbar vertebral bodies are distinguished from the thoracic bodies by the absence of rib facets. The lumbar vertebral bodies (vertebrae) are the heaviest components, connected together by the intervertebral discs.

Pedicles:

The pedicles are very strong, directed backward from the upper part of the body; consequently, the inferior vertebral notches are of considerable depth. They are made of thick cortical bone. Each vertebral arch is composed of 2 pedicles.

Intervertebral Discs

The disc is made up of, the nucleus pulposus and the annulus fibroses.

Annulus fibrous:

The annulus fibrous is much more fibrous than the nucleus. It also has a much higher collagen content and lower water content (lower in proteoglycan) when compared to the nucleus. The annulus is made of 15 to 25 concentric sheets of collagen (a tough cartilage-like substance) that are called Lamella.

Foramen:

The foramen are wider apart than the latter, since in the articulated column the inferior articular processes are embraced by the superior processes of the adjacent vertebra.

Transverse process:

The transverse processes are long, slender, and horizontal in the upper three lumbar vertebrae.

LigamentumFlavum :

The ligamentumflavum is a strong ligament that connects the laminae of the vertebrae.

Nucleus pulposus :

The nucleus pulposusis the water-rich (proteoglycan-rich), gelatinous center of the disc, which is under very high pressure when the human is upright--especially in the seated or flexed position. It has two main functions to bear or carry the downward weight of the human body and to act as a 'pivot point' from which all movement of the lower trunk occurs. It's third function is to act as a ligament and bind the vertebrae together.

Lamina:

The laminae are broad, short, and strong; the vertebral foramen is triangular, larger than in the thoracic, but smaller than in the cervical region.

Spinous process:

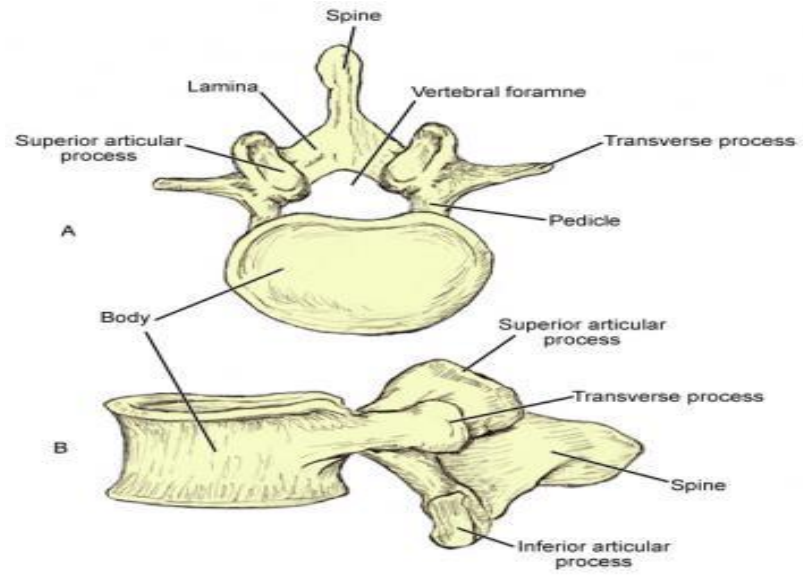
The spinous process is thick, broad, quadrilateral, it projects backward and ends in a rough, uneven border.

Articular process:

The superior and inferior articular processes are well-defined, projecting respectively upward and downward from the junctions of pedicles and laminae.

Facet Joint:

The facets on the superior processes are concave, and look backward and medial ward, those on the inferior are convex, and are directed forward and lateral ward.



THE SACRUM

The sacrum is a large, flattened, triangular bone formed by the fusion of five sacral vertebrae. It forms the posterosuperior part of the bony pelvis, articulating on either side with the corresponding hip bone at the sacroiliac joint. The upper part of the sacrum is massive because it supports the body weight and transmits it to the hip bones. The lower part is free from weight, and therefore tapers rapidly.

Being triangular, the sacrum has a base or upper surface, an apex or lower end, and four surfaces – pelvic, dorsal and right and left lateral. The pelvic surface is smooth and concave. The dorsal surface is irregular and convex. The lateral surface is irregular and partly articular.

The sacrum is divided by rows of foramina into:

(a) Median portion, traversed by the sacral canal.

(b) A pair of lateral masses formed by fusion of the transverse processes posterior, and of the costal elements anteriorly.

When placed in the anatomical position:

(a) The pelvic surface faces downwards and forwards.

(b) The upper surface of the body of the first sacral vertebra slopes forwards at an angle of about 30 degrees.

(c) The upper end of the sacral canal is directed almost directly upwards and slightly backwards.

FEATURES:

BASE

The base is directed upwards and forwards. It is formed by the upper surface of the first sacral vertebra, and presents features of a typical vertebra in a modified form.

1. The body is lumbar in type. It articulates with vertebra L5 at the lumbosacral joint. The projecting anterior margin is called the sacral promontory. The surface slopes forwards at an angle of 30 degrees.
2. The vertebral foramen lies behind the body, and leads into the sacral canal. It is triangular in shape.
3. The pedicles are short and are directed backwards and laterally.
4. The laminae are oblique.
5. The spine forms the first spinous tubercle.
6. The superior articular processes project upwards. The facets on them are directed backwards and medially.
7. The transverse processes are highly modified.

   The base of the lateral mass, forms a broad sloping surface spreading fan wise from the side of the body. It is called the *ala* of the sacrum. The ala is subdivided into a smooth medial part and a rough lateral part.

APEX

The apex of the sacrum is formed by the inferior surface of the body of the fifth sacral vertebra. It bears an oval facet for articulation with the coccyx.

PELVIC SURFACE

This is concave and directed downwards and forwards. The median area is marked by four transvers ridges, which indicate the lines of the bodies of the five sacral vertebrae. These ridges end on either side at the four pelvic sacral foramina, which communicate with the sacral canal through the intervertebral foramina, which communicate with the sacral canal through the intervertebral foramina. The bony bars between the foramina represent the *costal elements.* Lateral to the foramina, the *costal elements* unite with each other and with the transverse processes to form the lateral mass of the sacrum.

DORSAL SURFACE

The dorsal surface of the sacrum is rough, irregular and convex, and is directed backwards and upwards.

1. In the median plane, it is marked by the *median sacral crest* which bears 3 to 4 spinous tubercles, representing the fused spines of the upper four sacral vertebrae. Below the 4^{th} tubercle, there is an inverted U – shaped gap in the posterior wall of the sacral canal. This is called as a *sacral hiatus.*
2. Lateral to the median crest, the posterior surface is formed by the fused laminae.
3. Lateral to the laminae and in line with the superior articular process of the first sacral vertebra, there are four articular tubercles, representing the fused articular processes of adjacent vertebrae. The inferior articular processes of the fifth sacral vertebra are free and form the *sacral cornua,* which project downwards at the sides of the sacral hiatus.
4. Lateral to the articular tubercles there are four *dorsal sacral foramina* .They communicate with the sacral canal through the intervertebral foramina.
5. Lateral to the foramina, there is the *lateral sacral crest* on which there are transverse tubercles, representing the fused transverse processes.

LATERAL SURFACE

It is formed by the fused transverse processes and the costal elements of the sacral vertebra. It is wide above and narrow below.The upper wider part bears an L – shaped auricular surface anteriorly, and a rough, deeply pitted area posteriorly.The auricular surface is formed by the costal elements. It articulates with the auricular surface of the hip bone at the sacroiliac joint.

SACRAL CANAL

It is formed by the sacral vertebral foramina, and is triangular on cross-section. The upper end of the canal appears oblique, but actually it is directed upwards in the anatomical position.Inferiorly, the canal opens at the sacral hiatus, and laterally it communicates through the intervertebral foramina with the pelvic and dorsal sacral foramina.

The sacral canal contains the spinal meninges. The *filumterminale*and the *subtural* and *subarachnoid* spaces end at the level of the second sacral vertebra. Therefore, the lower sacral nerves and filumterminale pierce the dura and arachnoid at this (S2) level.

ATTACHMENTS ON THE SACRUM

1. The anterior and posterior edges of the body of the first sacral vertebra give attachment to the lowest fibers of the anterior and posterior longitudinal ligaments. The lamina of this vertebra provide attachment to the *lowest pair of ligamentaflava.*
2. The ala attachment to the lumbosacral ligament posteriorly. The upper part of the *ventral sacroiliac ligament* is attached to its margin.
3. The middle three pieces of the sacrum gives origin to the *piriformis.* The area extents into the intervals between the pelvic sacral foramina and is E – shaped.
4. The interosseous sacroiliac ligament is attached to the rough pitted area of the lateral surface, behind the auricular surface.
5. The lower narrow part of the lateral surface, below the auricular surface gives origin to the *gluteus maximus;* attachment to the *sacrotuberous* and *sacrospinous ligaments*.
6. The inferior lateral angle gives attachment to the *lateral sacrococcygeal ligament.*

RELATION OF THE SACRUM

1. The smooth part of the ala is related, from medial to lateral side, to the *sympathetic chain,* the *lumbosacral trunk,* the *iliolumbar artery,* and the *obturator nerve.* All these structures are overlapped by the psoas major muscle.

2. The pelvic surface is related to:
   (a) The *median sacral vessels* in the median plane.
   (b) The *sympathetic trunks* along the medial margin of the pelvic foramina.
   (c) The peritoneum in front of the bodies of the upper 2 ½ pieces, interrupted obliquely by the attachment of medial limb of the *pelvic mesocolon.*
   (d) The rectum in front of the bodies of the lower 2 ½ pieces.

STRUCTURES TRANSMITTED THROUGH FORAMINA

1. The pelvic sacral foramina transmit:
   (a) The *ventral rami of upper four sacral nerves.*
   (b) The lateral sacral arteries.
2. The dorsal sacral foramina transmit the *dorsal rami of the upper four sacral nerves.*
3. The following structures emerge at the sacral hiatus.
   (a) The 5^{th} *sacral nerves* which groove the lateral parts of the fifth sacral vertebra.
   (b) A pair of *coccygeal nerves.*
   (c) Filumterminale which passes to the coccyx.

SEX DIFFERENCES

The sacrum shows a number of important sexual differences. These are follows.

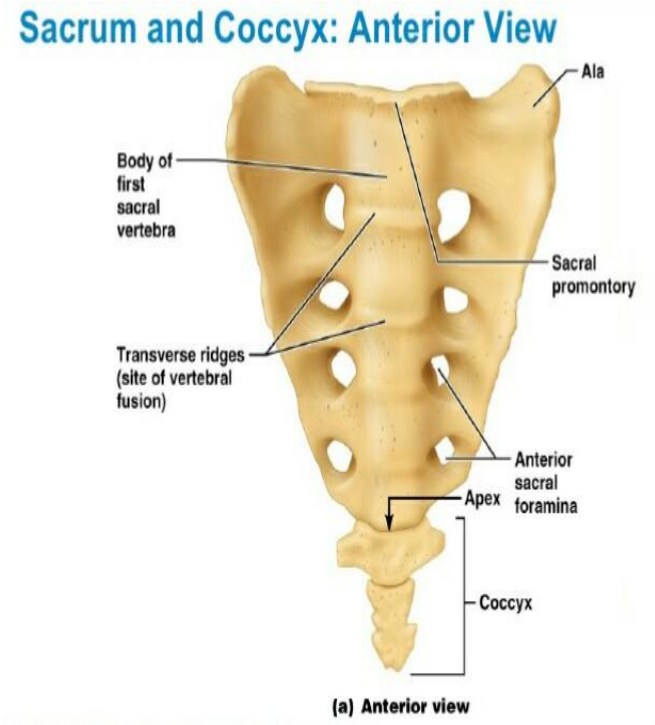
1. The relationship of the length and breadth of the sacrum can be expressed quantitatively by the using the *sacral index* which is calculated as follows.

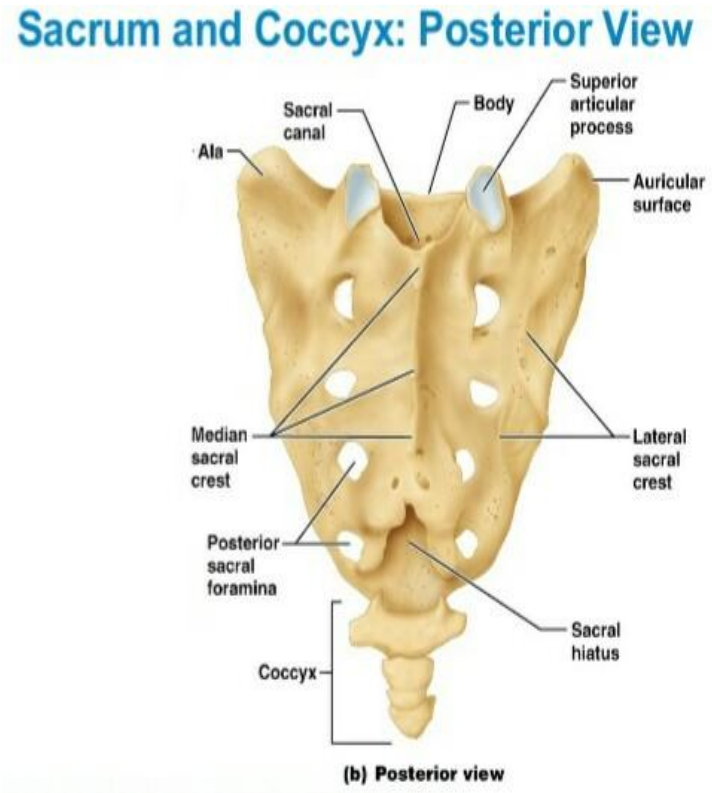
$$\frac{\text{Breadth across the base} * 100}{\text{Length from promontory to apex}}$$

The male sacrum is longer and narrower than in the female. The average sacral intex is about 105 in the male and about 115 in the female.

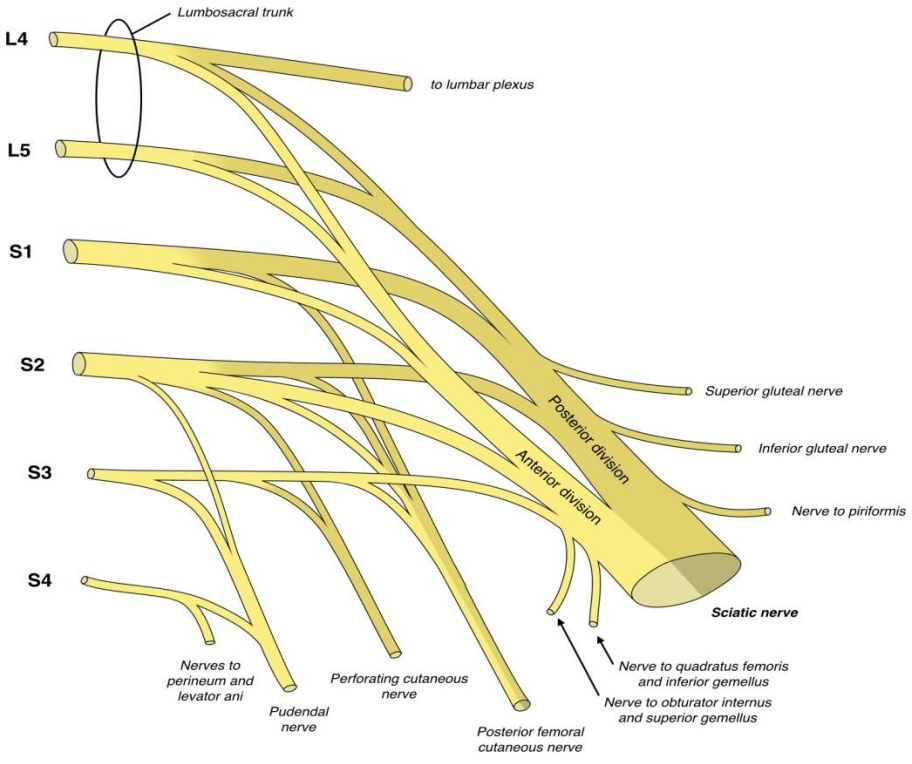
2. The width of the body of first sacral vertebra is greater than that of each ala in the male. In female, the two are equal.
3. The dorsal concavity of auricular surface is less marked in male. In both, the auricular surface extends on to upper three sacral vertebrae.

4. The concavity on the ventral aspect of sacrum is more uniform, and is shallower in males. In females, the concavityis irregular especially between S1 and S2 and between S3 and S4.
5. The sacrovertebral angle is more prominent in the female and the downward direction of the pelvic surface is greater than in the male. The size of pelvic cavity is more in females.[55]





SACRAL PLEXUS



It is formed by ventral rami of part of L4, L5, S1, S2, S3. Few muscular branches are given off from the rami. Then these divide into ventral and dorsal divisions.

Branches arising from ventral divisions are:

- Nerve to quadratus femoris(L4, L5, S1): Supplies quadratus femoris, inferior gemellus and hip joint.
- Nerve to obturatorinternus(L5, S1, S2): Supplies obturator internus and superior gemellus.
- Pudendal nerve (S2, S3, S4).
- Perforating cutaneous nerve (S3, S4): Supplies small area of skin of gluteal region.
- Tibial part of sciatic nerve (L4, L5, S1, S2, S3): Supplies all muscles of the calf and of the sole.
- Posterior cutaneous nerve of thigh (S1, S2): Supplies skin of back of thigh.

Branches from dorsal divisions are:

- Superior gluteal nerve (L4, L5, S1): Supplies gluteas medius, gluteus minimus and tensor fascia latae.
- Inferior gluteal nerve (L5, S1, S2): Supplies only gluteus maximus.
- Common peroneal part of sciatic nerve (L4, L5, S1, S2,): Supplies evertors and foot and dorsiflexors of ankle joint and extensor digitorum brevis.[56]

SCIATICA

Sciatica refers to pain, weakness, numbness or tingling in the leg. Sciatica is a relatively common condition with a lifetime incidence varying from 13% to 40%. The common corresponding annual incidence of an episode of sciatica ranges from 1% to 6%.

Definition:

Sciatica refers to pain that radiates along the sciatic nerve and is typically felt in the buttocks, down the back of the leg, and possibly to the foot.

- The affected leg may feel weak and thin than other leg.
- It may feel like a mild tingling and burning sensation.
- The sensations may also be felt on the back of the calf or on the sole of the foot.
- Pain that is worse when you lie down or awakens you at night.
- This episode of back pain has lasted longer than 4 weeks.
- Redness and swelling on the lower limb.
- Sciatica is usually felt in only one leg at a time. Sometimes, a sensation like an electric shock can be felt along the nerve. The pain can range from a mild ache to incapacitating pain. Sciatica pain is often felt when you sneeze, cough, go to the toilet, or when you're sitting, and may be accompanied by lower back pain.[57]

Pathophysiology:

The intervertebral disc was implicated in the path physiology of sciatica,[58] and with the assumption that the protruding disc exerted pressure on sciatic nerve roots; the Treatment was surgical removal of the disc. Any subsequent improvement in symptoms was attributed to relief of pressure on the nerve roots. Kelly, however, suggested that pressure on a nerve results in loss of function and is rarely associated with pain .

Types of sciatica:

Acute sciatica (short-term):

Acute sciatica may be foregoing between four to eight week.

Chronic sciatica (long-term):

Chronic sciatica persists for longer period of time. It may require physical therapy which may include exercise, applied heat, and other techniques.[59]

Symptoms and Signs:

Sciatica pain can vary widely, but some common symptoms are,Some people have sharp pain in one part of the leg or hip and numbness in other relatively common finding in asymptomatic patients.

Common Causes of Sciatica:

The major causes of sciatica are:

Lumbar Bulging or Herniated Disc:

A bulging disc is also known as a contained disc disorder. This means the gel-like center (nucleus pulpous) remains enclosed within the tire-like outer wall (annulus fibrosus) of the disc. A herniated disc occurs when the nucleus breaks through the annulus. It is called a non-contained disc disorder. Whether a disc bulges or herniated, disc material can press against an adjacent nerve root and compress delicate nerve tissue and cause sciatica. The consequences of a herniated disc are worse. Not only does the herniated nucleus cause direct compression of the nerve root against the interior of the bony spinal canal, but the disc material itself also contains an acidic, chemical irritant (hyaluronic acid) that causes nerve inflammation. In both cases, nerve compression and irritation cause inflammation and pain, often leading to extremity numbness, tingling and muscle weakness.

Lumbar Spinal Stenosis Spinal:

Stenosis is a nerve compression disorder most often affecting mature people. Leg pain similar to sciatica may occur as a result of lumbar spinal stenosis. The pain is usually positional, often brought on by activities such as standing or walking and relieved by sitting down. Spinal nerve roots branches outward from the spinal cord through passage ways called neural foramina comprised of bone and ligaments. Between each set of vertebral bodies, located on the left and right sides, is a foramen. Nerve roots pass through these openings and extend outward beyond the spinal column to innervate other parts of the body. When these passageways become narrow or clogged causing nerve compression, the term foraminal stenosis is used.

Spondylolisthesis:

Spondylolisthesis is a disorder that most often affects the lumbar spine. It is characterized by one vertebra slipping forward over an adjacent vertebra. When a vertebra slips and is displaced, spinal nerve root compression occurs and often causes sciatic leg pain. It is categorized as developmental (found at birth, develops during childhood) or acquired from spinal degeneration, trauma or physical stress i.e. weightlifting.

Trauma:

Sciatica can result from direct nerve compression caused by external forces to the lumbar or sacral spinal nerve roots. Examples are motor vehicle accidents, falling down, football and other sports. The impact may injure the nerves or occasionally fragments of broken bone may compress the nerves.

Piriformis Syndrome:

Piriformis syndrome is named for the piriformis muscle and the pain caused when the muscle irritates the sciatic nerve. The piriformis muscle is located in the lower part of the spine, connects to the thighbone and assists in hip rotation. The sciatic nerve runs beneath the piriformis muscle. Piriformis syndrome develops when muscle spasms develop in the piriformis muscle thereby compressing the sciatic nerve.

Spinal Tumors:

Spinal tumors are abnormal growths that are either benign or cancerous (malignant). Fortunately, spinal tumors are rare. However, when a spinal tumor develops in the lumbar region, there is a risk for sciatica to develop as a result of nerve compression.

Obesity & Sciatica:

Most people know that obesity contributes to the development of coronary heart disease, diabetes, high blood pressure and colon cancer. The obesity is a causative factor to back pain. Being overweight or obese can significantly contribute to symptoms associated with osteoporosis, Osteoarthritis, rheumatoid arthritis, degenerative disc disease.

Examination:

Examination is preferably done with he patient undressed. The spine and stance are inspected while he patient is standing, to note lumbar lordosis , thoracic kyphosis, scoliosis, tilt from “sciatic scoliosis”, flexed lower extremities to relieve root tension , muscle spasm, and skin nevi over the spine. Gait and motion are noted, including toe and heel gait, to determine muscular weakness and to observe any inconsistent or exaggerated posturing.

Forward bending is measured and can be crudely quanitated by an estimate of flexion or the distance of the fingers from the floor. Lateral bending may be asymmetric with unilateral root entrapment. Hyper extension will elicit pain from

inlamed facet joints. The spine is palpated to determine local tenderness, the step off of spondylolisthesis, or the defect of spinabifida, and percussed to produce local pain or sciatica and, in the costo vertebral angle, to elicit pain of renal.[60]

Factors:

Risk factors for sciatica include the following :

- Age (sciatica is more common between 30 and 50 years of age)
- Diabetes (increases the risk for nerve damage)
- Genetics (e.g.,inherited spine abnormalities)
- Menopause (ending of menstrual periods in women; may lead to bone loss)
- Physical activities that involve heavy lifting or twisting the back (e.g., golf)
- Sedentary (inactive) lifestyle, including occupations that require sitting for long periods of time.
- Obesity, smoking or consuming alcohol excessively.
- Injury.[61]

Complication:

The condition can lead to complications and result in permanent nerve damage.

Complications of sciatica include the following :

- Leg injuries that do not heal properly or recur.
- Immobility (inability to move the leg normally)
- Partial or complete loss of feeling (sensation) in the leg.[62]

Investigations:

1. X- Ray Lumbar Spine

- AP view – look for vertebral column, any pedicular lesion.
- Lateral view – shape & size of vertebral body.

  Oblique view– side to side collapse,Inter vertebral disc space

2. Computed Tomography(CT):

It is useful in non invasive painless outpatient procedure. It gives a cross sectional study of the pathology.CT helps to detect the foraminal structures and lateral disc prolapse.

3. MRI

MRI helps to detect intra-spinal lesion, examine entire spine, identifies degenerative disc.

4. Myelograph

Consists of injecting radio opaque dye (myodil was used earlier now it is the water soluble iopamiro 300, which is being used) into the spinal canal and taking radio graphs of the back.**(63)**

Modifications of SLR test:

Sciatic nerve stretch test:

Patient is in supine position ,one of the leg is raised with one hand, ipsilateral knee is pressed over by other hand. This test produce tension in the hamstring muscles which in turn compresses the sciatic nerve and produces pain.

Bregard's test:

After doing SLRt, dorsiflex the foot. This further tension on the sciatic nerve and the patient complains of pain.

Lasegue's test:

Here the hip is flexed, knee is flexed and the leg is slowly straightened.

Bickling's sign:

Perform as SLRt until the patient complaints of pain. Now ask the patient to flex the knee.Pain decreases due to relief of tension on the nerve.

Sicard's test:

After doing SLRt, dorsiflex the great toe. This puts further tension on the sciatic nerve and the patient complains of the pain.

Fajersztajn's test:

After doing SLRt, dorsiflex the foot. This tenses the sciatic nerve and the patient complains of the pain.

Weel leg raising test:

Here, the patient is asked to perform SLRt of the normal limb. If the patient complains of pain on the affected side, then it is highly suggestive of disc prolapse and this is a pathognomonic test which has more relevance then the conventional SLRt.

Bilateral straight leg raising test:

Here, patient is asked to raise both the legs simultaneously. This is a test for the sacroiliac joint rather than the spine. During the first 70 degree, stress is on the SI joint, over 70 degree stress is on the lumbar spine.

Femoral nerve stretch test (Reverse SLR Test):

Here, the patient is in prone position and is asked to lift the leg straight. This puts a stretch on the femoral nerve. If the patient complains of the pain it indicates high level disc prolapsed (L1-L2-L3).[(64)]

Prevention of sciatica

- Avoid smoking, which may increase inter vertebral disc degeneration.
- Eat a healthy diet and maintain a body weight.
- Exercise regularly to strengthen back and abdominal muscles.
- Maintain good posture (especially when sitting or standing for long periods of time.
- Practice proper body mechanics when lifting, bending and twisting.[(65)]

TRIAL DRUG

அயகாந்த செந்தூரம்

பாந்தமாஞ் செந்தூரம் பாடுகிறோம் பாவையரே
காந்த மரப்பொடியுங் கட்டாகாச் - சேர்ந்தவைகள்
ஒர்நிறையாய்ச் சுத்திசெய் தூட்டியரை கல்வத்தி
லேர்நிறைந்த காமப்பா லிட்டு.

பாலிட் டரைத்துவில்லை பத்திரமாய்க் காயவைத்து
மேலிட்டோட் டில்மண்செய் மெல்லியாய் - காலிட்ட
ஐம்ப தெருப்புடஞ்செய் தாறினபி னீயெடுத்துப்
பண்புடனே செய்முறையைப் பார்.

பாருலகி லின்னம் பகருங் கொடுப்பையினீர்
நாருகாந் தைச்சாறு நாட்டிரண்டும் - ஒருநிறை
நாற்சாம மாட்டி நயந்துமுன் போற்புடஞ்செய்
தாழ்ச்சியிலை செந்தூரந் தான்.

செந்தூரங் குன்றியெடை சுக்கினது தூளிற்கொள்
வெந்தூறு கின்றபடர் மேகமெங்கே - நந்திசொன்னார்
காமாலை சூலை கழல்வாதங் கால்வெடிப்பு
போமான பித்தவெட்டை போற்று.

போற்றுங்கை கால்குடைச்சல் பொல்லாத குன்மமெல்லாம்
மாற்று மதிசார மாருதமும் - தேற்றமிகு
பத்தியஞ் செய்யெண் புளிபுகையும் பார்த்தகற்று
சத்தியஞ்சொன் னேன்பிணிபோந் தான்.(66)

Ingredients:

- PURIFIED AYAM (Iron)
- PURIFIED KAANTHAM (Magnetic oxide of iron)
- *PONNANGANNI SAARU (Alternanthera sesssails)*
- *NAARUKARANTHAI SAARU (Spheroanthus amaranthoides*)
- MILK

Standard operative procedure:

Purification of metal drugs :

Metal drugs are purified as mentioned in *Gunapadam Thadhu Seeva Vaguppu*.[67]

Preparation :

Purified magnetic oxide of iron and purified Iron were taken in equal quantity, they ground with milk in a stone mortar. Then it was made into a pellets and dried. The pellet was kept in a earthen crucible which was closed with another earthen crucible and was sealed by using mud smeared cloth. Once the mud smeared cloth was dried , it was incinerated by using 50 cow dung cakes. Again the mixture which was kept in earthen crucible were ground with equal quantities of *Alternanthera sesssails* and *Spheroanthus amaranthoides* juices for 4 *samam* (12 hrs). once again, it was incinerated with 50 cow dung cakes. The end product was collected and kept in an air tight container.

Drug storage : Drug was stored in clean dry air tight container.

Dose : 130 mg, 2 times a day

Adjuvant : Chukku powder.

Duration : 48 days.

Literature review of trial drugs

Iron(ferrum):

Iron is found in mountains and in earth in association with certain materials .It is also found in plants and animals.

பொதுகுணம் :

"பாண்டுவெண் குட்டம் பருந்தூல நோய்சோபை
மாண்டிடச்செய் மந்தங்கா மாலைகுன்மம் பூண்ட
நட்டமும்போம் பேதிபசி யுண்டாங் கருந்தாது
நட்டமிடுங் கால்".(68)

Description:

Iron improves the properties and functions of blood.some preparations of iron may cause constipation.In order to prevent it,three myrobalans are added to iron preparations.Iron stimulates the function of all the organs of the body and thus it acts as a tonic.

Iron preparations are used in treating the diseases like anaemia ,jaundice,leucoderma,obesity,dropsy,anorexia,peptic ulcer,spermatorrhoea,diarrhoea and dyspepsia.(69)

Taste: Iron has Astringent and mild Sour and bitter taste.

Action: Iron has Tonic,Haemopoietic,Appetite stimulant,Health promoting properties.

Potency: Its potency is hot.

Purification of iron: The juice of jambul fruit (Syzigium cumini) is poured over the iron powder till the powder is immersed in the juice. It is then kept in sunlight until the juice completely dries and then washed.This process is repeated six times to get the purified iron.(69)

Before Purification

After Purification

Siddha aspect of kaantham (magnetic oxide of iron):

Chemical name-Magnetic oxide of Iron

Other names:

Sivalogasevagan, Tharanikk Naatham,SoothaAngusam,Navaloga Thurati,Kaayachithikku Paathiravan,Murugan Puranam.[70]

Distribution:

Magnetite is sometimes found in large quantities in beach sand.Such mineral sands/ black sands are found in various places such as California and coastal area of Newzealand.

Types:

There are five varieties of Kaantham

1.Kal kaantham (Piramugam)

2.Oosi kaantham(Kambagam)

3.Pachai kaantham(Karshagam)

4.Arakku kaantham(Dhiravagam)

5.Mayir kaantham(Romagam)

Properties:

Color - Black to grayish

Molecular formula - $Fe3O_4$,FeO,Fe_2O_3

Density - $5g/cm^3$

Melting point - 1538^0c

Ph - 7

Specific Gravity - 5.17 to 5.18

பொது குணம் :

காந்தத்தாற் சோபைகுன்மங் காமிலமே கம்பாண்டு
சேர்ந்ததிரி தோடவெட்டை சீதங்கால் - ஓய்ந்தபசி
பேருதரகங் கண்ணோய் பிரமியநீ ராமையும்போம்
ஓரினிறை யாயுளூறும் உன்.

காந்ததினால் செய்யப்பட்ட மருந்துகள் உயிரை இரட்சித்து வாத கணப்பிணிகளைக் கொல்லும்.

Taste – Maximum astringent, little Pungent and little bitter.

Actions – Apetizer, Nutrient, Alternative, cordial improves blood

In general, the kaantham has got the similar properties as Iron.However, it is considered that kaantham is superior to Iron in many aspects. This is very effective in the treatment of swelling ,ulcer ,jaundice, veneral diseases, kapha vatha diseases,leucorrhoea, dyspepsia, gonorrhea ,anasarca,eye diseases and splenomegaly.It also increases one's life span.

Purification of Kaantham (Magnetic oxide of iron)

Materials required

Kaantham - 250 gm

Horse gram decoction - 600 ml

Procedure:

The magnetic oxide of iron is heated in a furnace and dipped in horse gram decoction for 15 times to get in purified form.

Consumption of milk boiled in a vessel made up of magnetic oxide of iron ,improves blood and strengthens the body.The boiled milk never spill over in a magnetic vessels.[71]

Before purification

After purification

PONNANGKANI : *Alternanthera sesssails*

Other names:kotuppai,seethai.

Family :Amaranthaceae

Suvai :Inippu

Thanmai :Thatpam

Privu : Inippu

பொதுகுணம்:

காசம் புகைச்சல் கருவிழிநோய் வாதமனல்

கூசும் பிலீகம் குதாங்குரநோய் - பேசிவையால்

என்னாங்கா ணிப்படிவம் எமமம் செப்பலென்னைப்

பொன்னாங்கா ணிக்கொடியைப் போற்று.[72]

Action:

Alterative, Cooling, Tonic, Constipation, Skin diseases, Splenomegaly, Fever, Burning sensation, Digestive.[73]

NARUNKARANTHAI (*Spheroanthus amaranthoides)*

Other name : siva karanthai

Family : Asteraceae.

Distribution :Throughout India.

Suvai :Thuvarppu,siru kaarppu.

Thanmai :Veppam.

Pirivu :Kaarppu.

பொதுகுணம் :

வாந்தி யரோசகத்தை மாற்றும் பசிகொடுக்கும்.

சாய்ந்தவிந்து வைக்கட்டுந் தப்பாதே - ஏந்தழகைத்

தண்டா துறச்சோர்க்குஞ் சாந்த பரிமளத்தைத்

தண்டாச் சிவகரந்தை தான்.

கந்த நாறு கரந்தை யதிங்குணம்

மந்த வாதங் கரப்பனை மாற்றிடுந்

தொந்த ரோகந் துடைக்கு மிருமலா

மந்த நோயுந் தணிக்கும் மாணையே

.

Action : Nerve tonic, Fever, Diuretic, Skin diseases, Jaundice, Vatha diseases, Antispasmodic.[74]

AYAKAANTHA CHENDHOORAM

METERIALS AND METHODS

PROTOCAL

Study Design

A clinical study on VATHASTHAMBAM (SCIATICA) was carried out in the post graduate department of Pothu Maruthuvam in Govt. Siddha Medical College attached to Arignar Anna Hospital of Indian Medicine, Chennai -106 during the period of 2015 to 2017.

The study was approved by Institutional Ethics Committee (IEC) and the approval number is **GSMC - CH - ME - 4 / 2015 / 008**. It was registered in **Clinical Trials Registry - India (CTRI)** and the registration number is **CTRI/ 2017 / 05 / 008575.**

Population and sample :

The population consists of all patients who were attending the OPD of Aringnar Anna Hospital, Arumbakkam, Chennai–106. Sample consists of VATHASTHAMBAM patients who satisfying the inclusion and exclusion criteria mentioned below.

Sample Size :

The trial size will be 20 patients.

Inclution Criteria

- Age – 18 to 60 yrs.
- Sex – Both male and female.
- Patients having pain in the back or leg that is worsened while sitting.
- Burning or tingling sensation down the leg.
- Weakness, numbness
- A constant pain on one side of the back
- A positive SLR test.
- Patient who undergo routine blood investigation.
- Patient who is willing to participate in trial and signing in consent form.

Exclusion Criteria

A potential subject who will meet any of the following criteria will be excluded from participation in this study :

- Fracture of vertebrae.
- Dislocation of vertebrae
- Deformities and congenital defects.
- Known case of Tuberculosis of spine.
- Known case of Neoplasm of spine.
- Pregnancy.
- Patients of age below 18 above 60 years.

Withdrawal Criteria

- Intolerance to the drug and development of any serious adverse reactions during the trial period.
- Patient turned unwilling to continue in the course of clinical trial.
- Increase in severity of symptoms.
- Patient will not take medication regularly.

Duration of Treatment :

48 days.

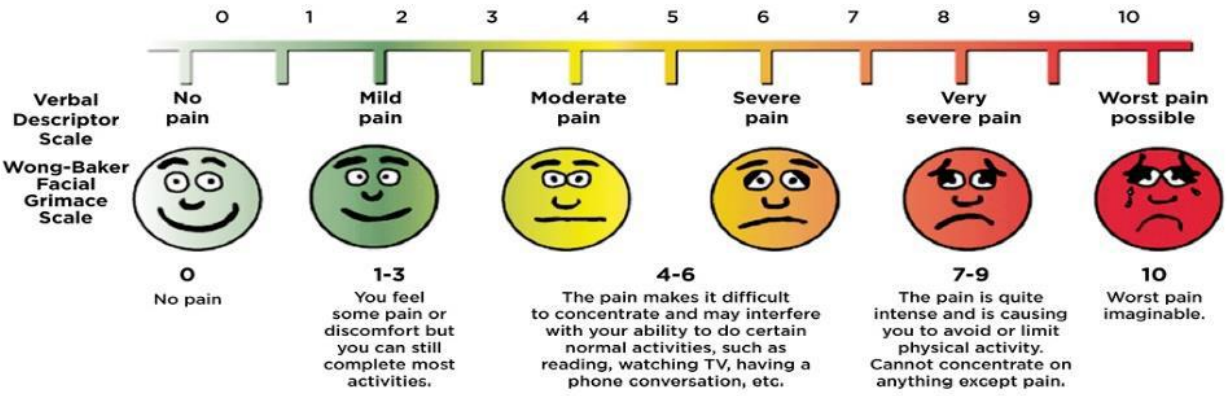
History taking :

The history includes past, personal, family, occupation, dietary habits, seasonal history, and associated history.

Improvement assessed by following assessment:

Universal pain assessement scal.

1.Universal Pain Assessment Scale:



Siddha Assesment:

Naa

Niram

Mozhi

Vizhi

Sparisam

Malam

Naadi

Moothiram – Neerkuri, Neikuri.

Routine Tests and Investigations :

- Blood test:

  TC, DC, ESR, Hb.

  Blood sugar (Fasting and Post prandial)

  Blood Urea, Serum Creatinine.

Urine:

Albumin

Sugar

Deposit

Specific Investigation:

X – Ray of lumbo sacral spine AP and Lateral view.

MRI whole spine.

Trial Medicine – *Ayakaantha chendhooram*

Dose: 130 mg, BD

Adjuvant : Chukku powder.

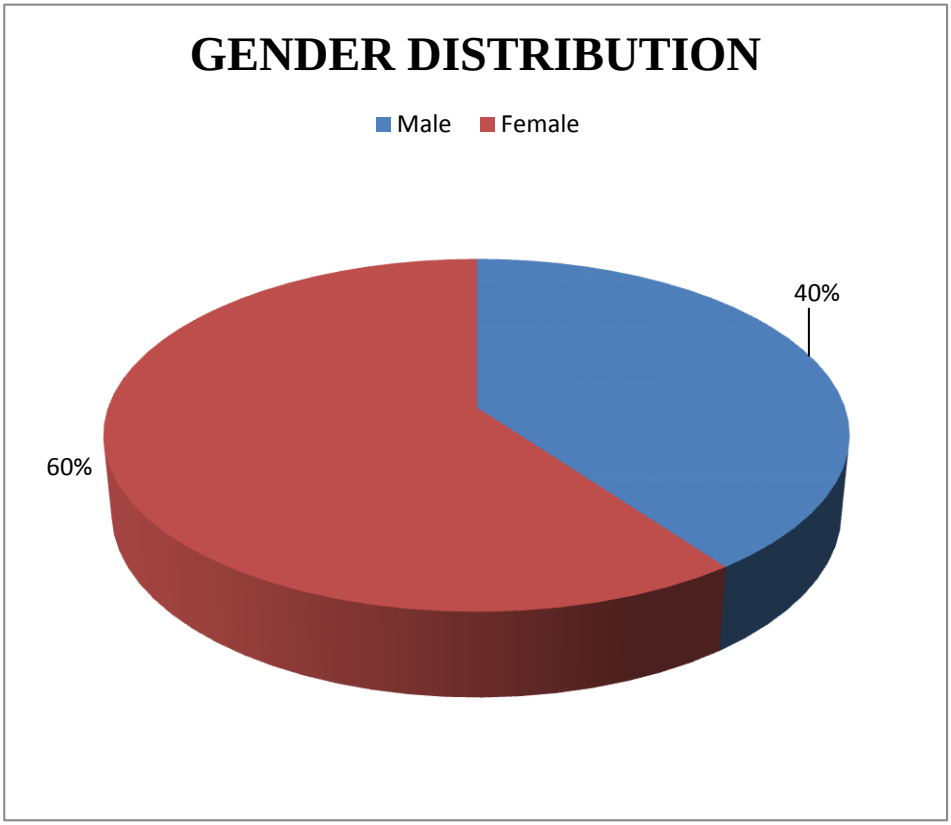
RESULT AND OBSERVATION

The study on Vathasthambam was carried out in 20 patients in the Post-Graduation Department of Pothu Maruthuvam, Government Siddha Medical College, Chennai-106 attached to Arignar Anna Hospital during 2015-2017 were analyzed. The observations were made and tabulated with following criteria.

- Gender Distribution
- Age Distribution
- Seasonal incidence
- Occupational status
- Socio economic status
- Diet reference
- Thinai
- Yakkai illakkanam
- Duration of illness prior to treatment
- Clinical manifestations
- Mukkutram- Vatham, Pitham, Kapham
- Ezhu udal Kattugal
- Envagai Thervugal
- Naadi
- Neikuri
- Result after treatment
- Grading of Results
- Overall Results

1.GENDER DISRIBUTION

S .NO	SEX	NO OF CASES	PERCENTAGE (%)
1	Male	8	40 %
2	Female	12	60 %



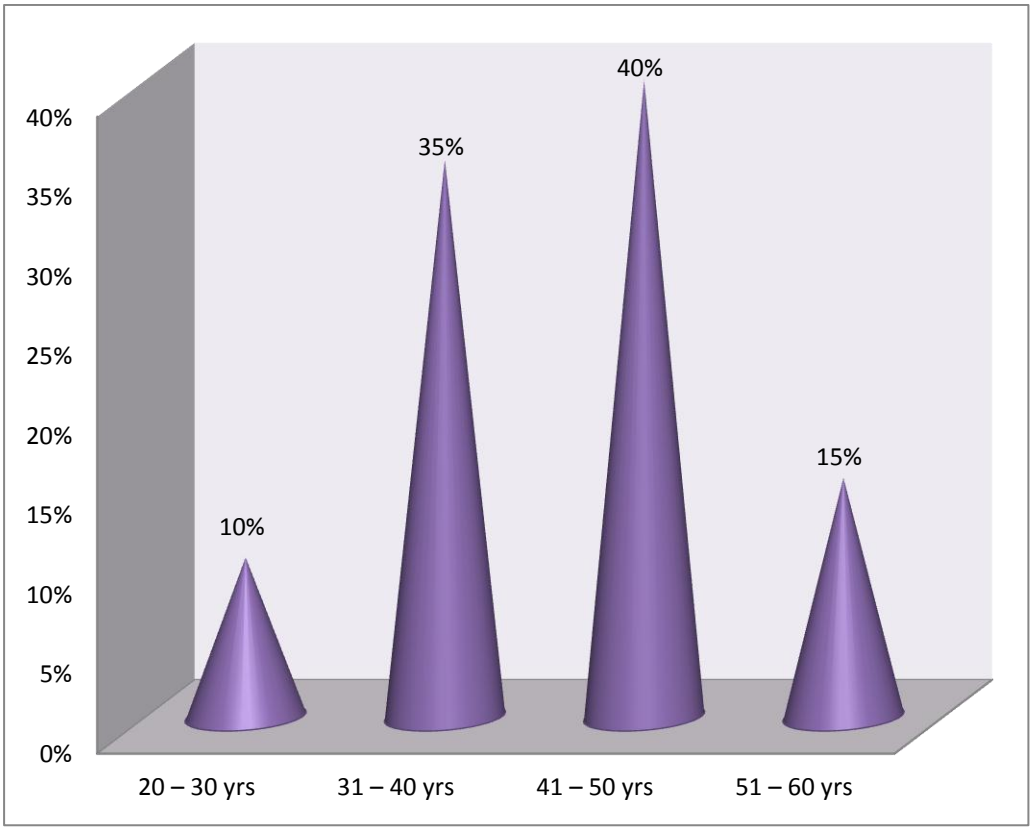
Inference:

From selected 20 cases of study 40% (8) of cases were male and 60% (12) were female.

2. AGE DISTRIBUTION

S.NO	AGE (YEARS)	NO OF CASES	PERCENTAGES (%)
1	20 – 30	2	10
2	31 – 40	7	35
3	41 – 50	8	40
4	51 - 60	3	15

AGE DISTRIBUTION

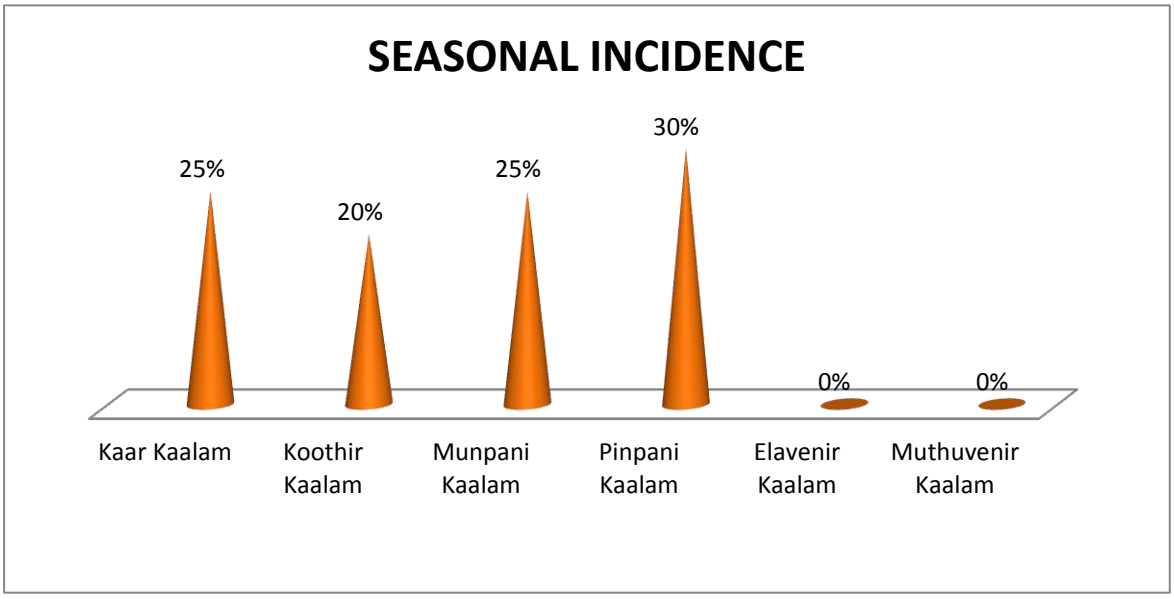


Inference:

Out of 20 cases 8 patients (40%) were between 41 – 50 years, 7 patients (35%) were between 31 – 40 years, 3 patients (15%) were between 51 – 60 years and 2 patients (10%) were between 20 – 30 years.

3. SEASONAL INCIDENCE

S.No	KAALAM (Season)	NO. OF CASES	PERCENTAGE (%)
1	Kaar Kaalam (Mid August – Mid October)	5	25%
2	Koothir Kaalam (Mid October – Mid December)	4	20%
3	Munpani Kaalam (Mid Dec – Mid Feb)	5	25%
4	Pinpani Kaalam (Mid Feb – Mid Apr)	6	30%
5	Elavenir Kaalam (Mid Apr – Mid Jun)	0	0%
6	Muthuvenir Kaalam (Mid Jun – Mid Aug)	0	0%

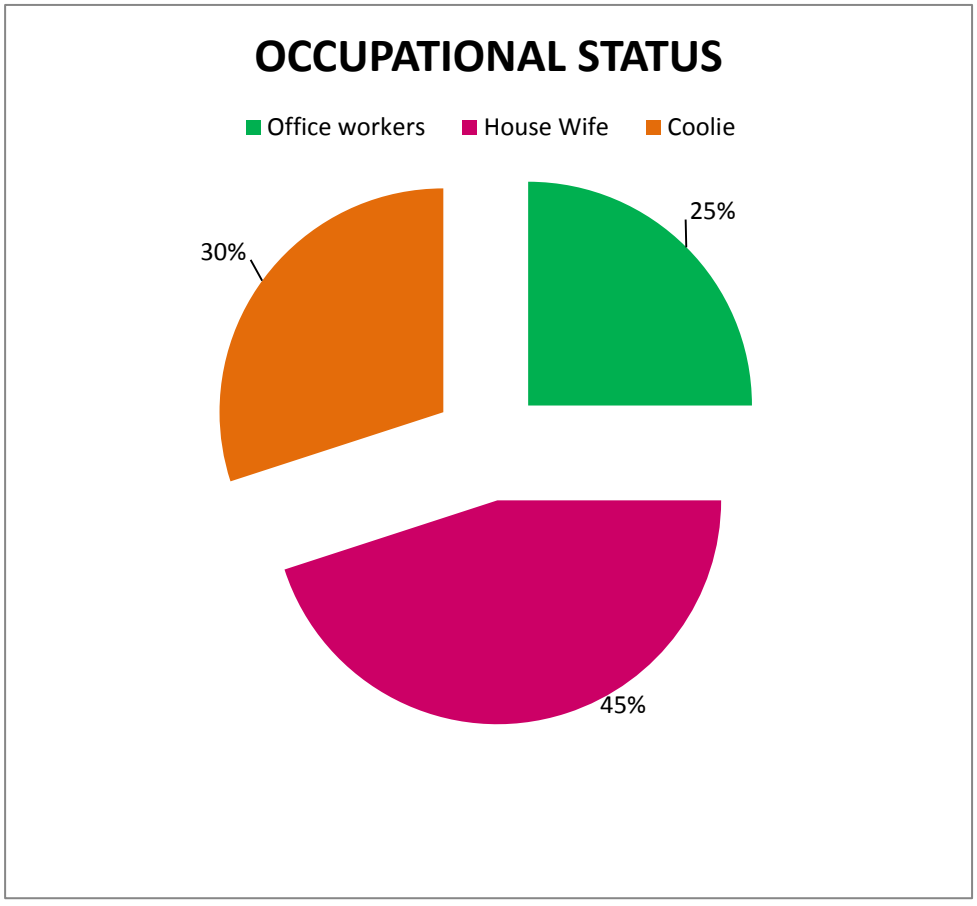


Inference:

According to Paruva kaalam highest incidence of 30% were noted in Pinpani kaalam and 25% cases were noted in Kaar kaalam and 25% comes under Munpani kaalam , 20% of cases were noted in Koothir kaalam.

4. OCCUPATIONAL STATUS

S.No	OCCUPATION	NUMBER OF CASES	PERCENTAGE (%)
1	Office workers	5	25%
2	House Wife	9	45%
3	Coolie	6	30%

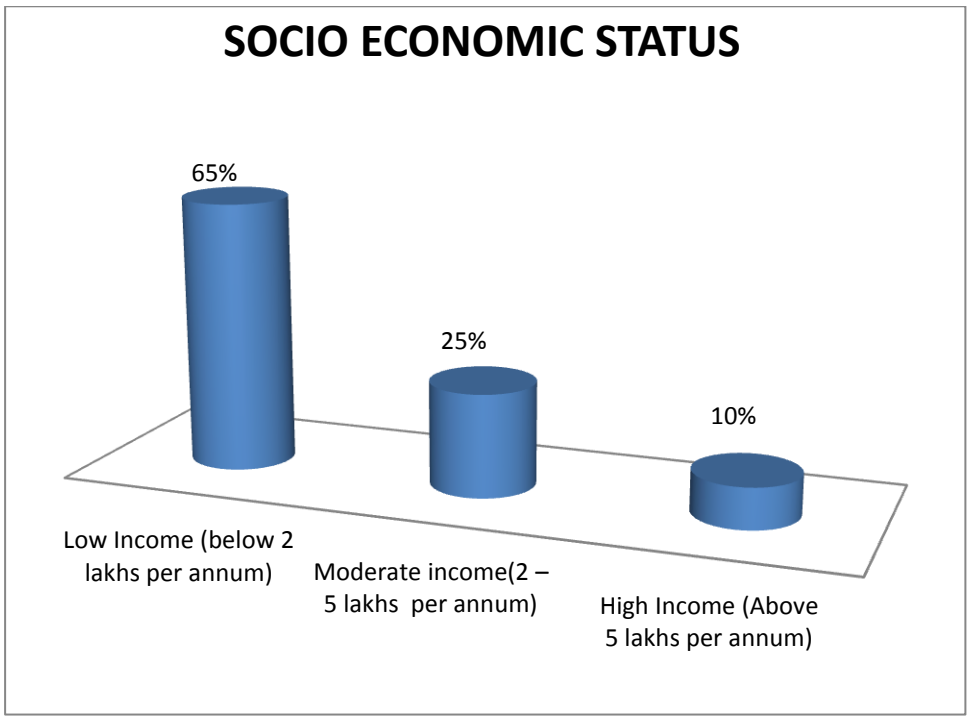


Inference:

From selected 20 cases, 9 patients (45%) were house wife, 6 patients (30%) were coolies, 5 patients (25%) were office workers.

5. SOCIO ECONOMIC STATUS

S.No	SOCIO – ECONOMIC STATUS	NUMBER OF CASES	PERCENTAGE (%)
1	Low Income (below 2 lakhs per annum)	13	65%
2	Moderate income(2 – 5 lakhs per annum)	5	25%
3	High Income (Above 5 lakhs per annum)	2	10%

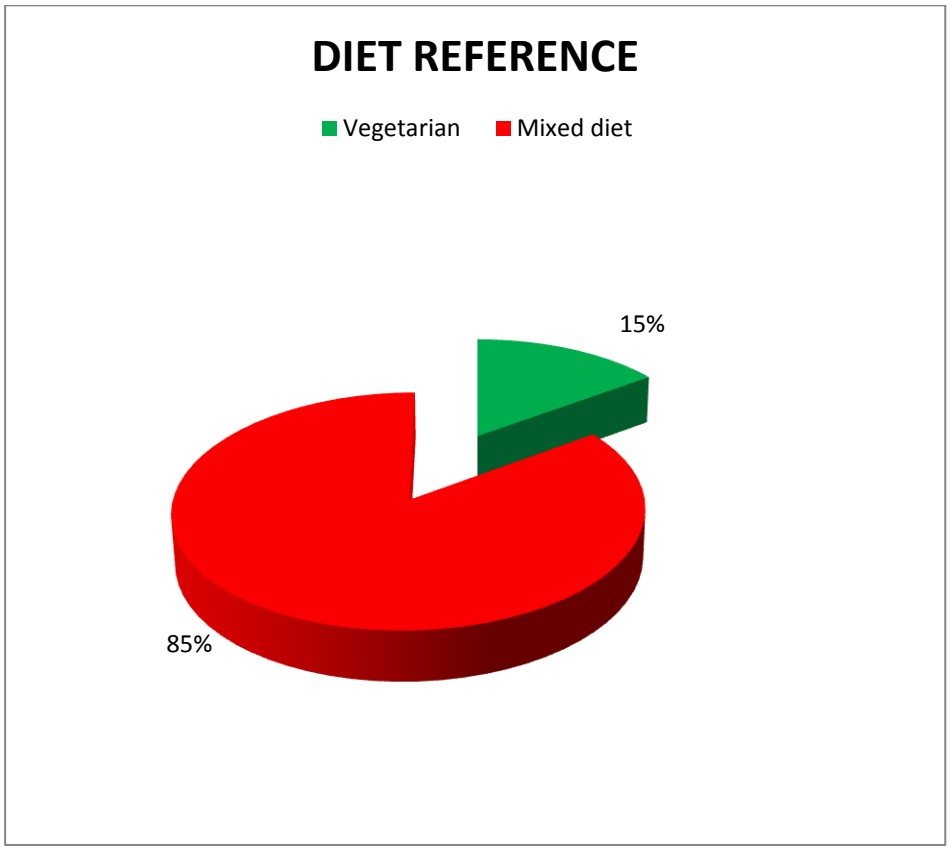


Inference:

Recording Socio Economic Status 13 patients (65%) were low income and 5 cases (25%) from middle income and 2 cases (10%) from high income.

6. DIET REFERENCE

S.No	DIET	NUMBER OF CASES	PERCENTAGE (%)
1	Vegetarian	3	15%
2	Mixed diet	17	85%

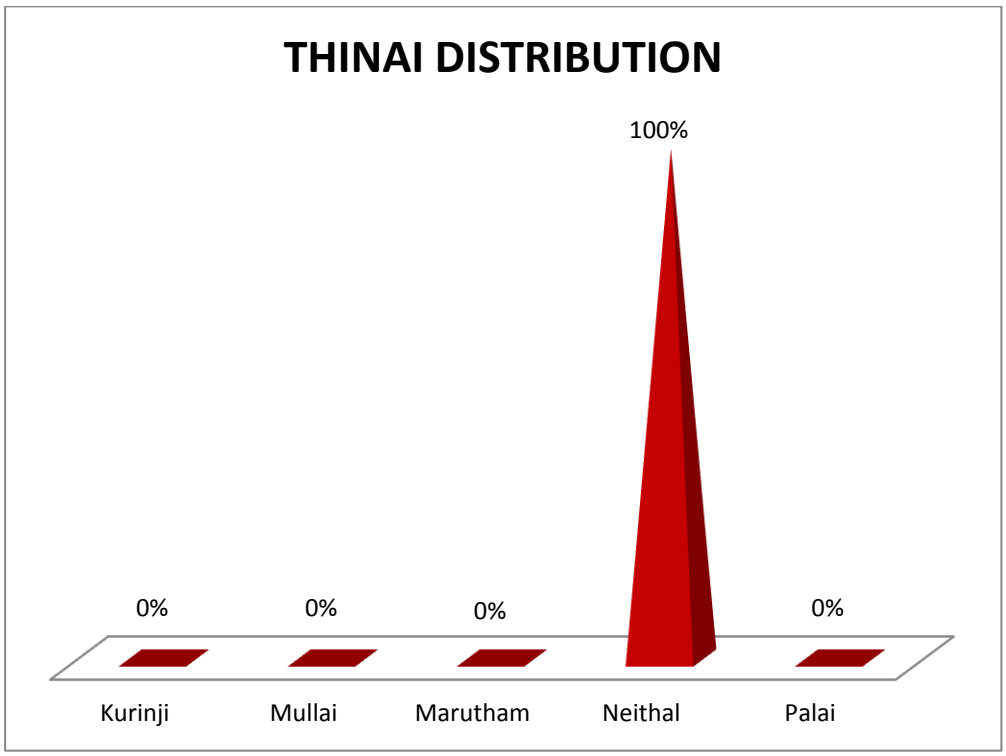


Inference

Out of 20 cases, most of the cases 17 (85%) were taken mixed diet, and 3 cases (15%) had vegetarian diet only.

7. THINAI DISTRIBUTION

S.NO	THINAI	NO. OF CASES	PERCENTAGE
1.	Kurinji	0	0%
2.	Mullai	0	0%
3.	Marutham	0	0%
4.	Neithal	20	100%
5.	Palai	0	0%

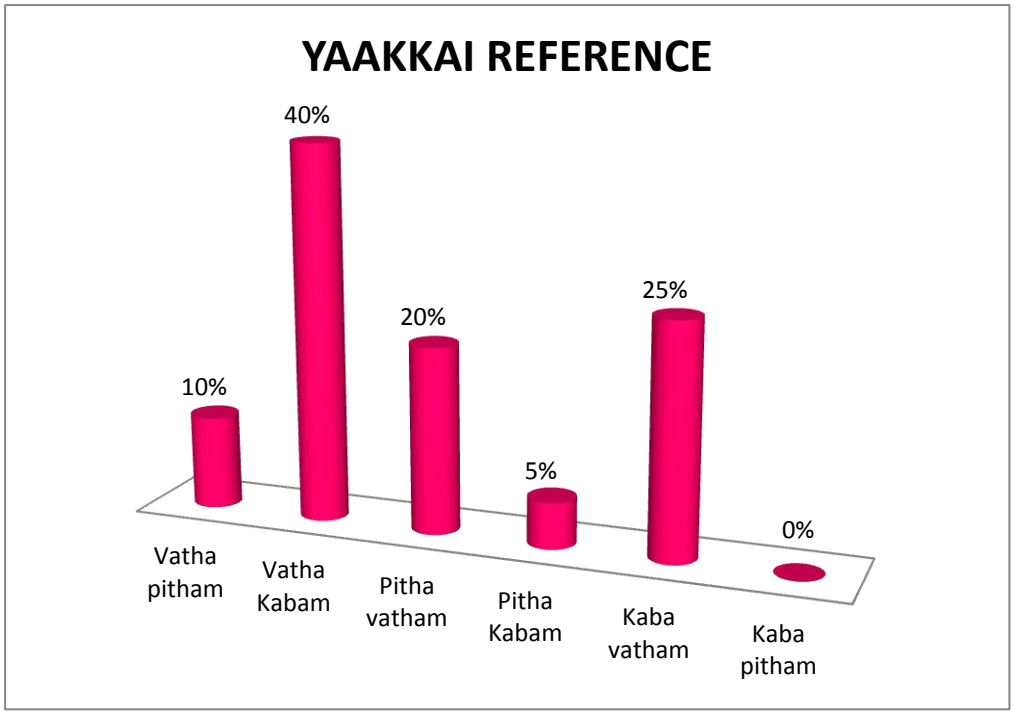


Inference:

According to the study, nearly 20 cases (100%) were from NEITHAL THINAL.

8. YAAKKAI REFERENCE

S.NO	ILAKKANAM	NO OF CASES	PERCENTAGE (%)
1.	Vatha pitham	2	10%
2.	Vatha Kabam	8	40%
3.	Pitha vatham	4	20%
4.	Pitha Kabam	1	5%
5.	Kaba vatham	5	25%
6.	Kaba pitham	0	0%

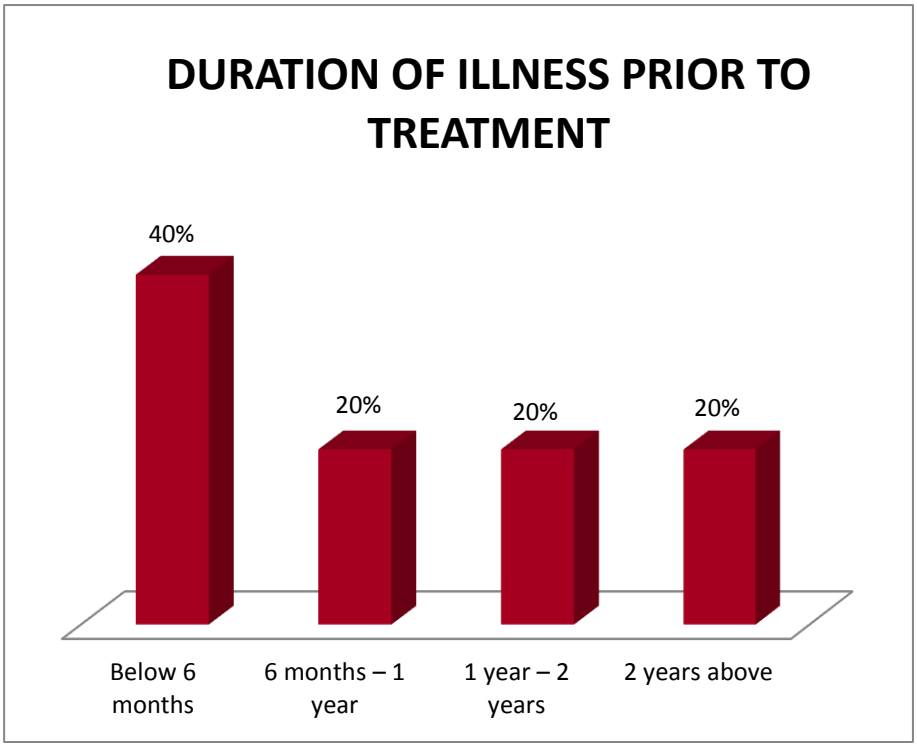


Inference:

According to the study, nearly 8 cases (40%) have Vatha pitha yaakkai, 4 cases (20%) have Vatha kaba yaakkai, 4 cases (20%) have Pitha vatha yaakkai, 2 cases (10%) have Pitha kaba yaakkai, 2 case (10%) have Kaba vatha yaakkai.

9. DURATION OF ILLNESS PRIOR TO TREATMENT

S.NO	DURATION OF ILLNESS	NO OF CASES	PERCENTAGE (%)
1.	Below 6 months	8	40%
2.	6 months – 1 year	4	20%
3.	1 year – 2 years	4	20%
4.	2 years above	4	20%

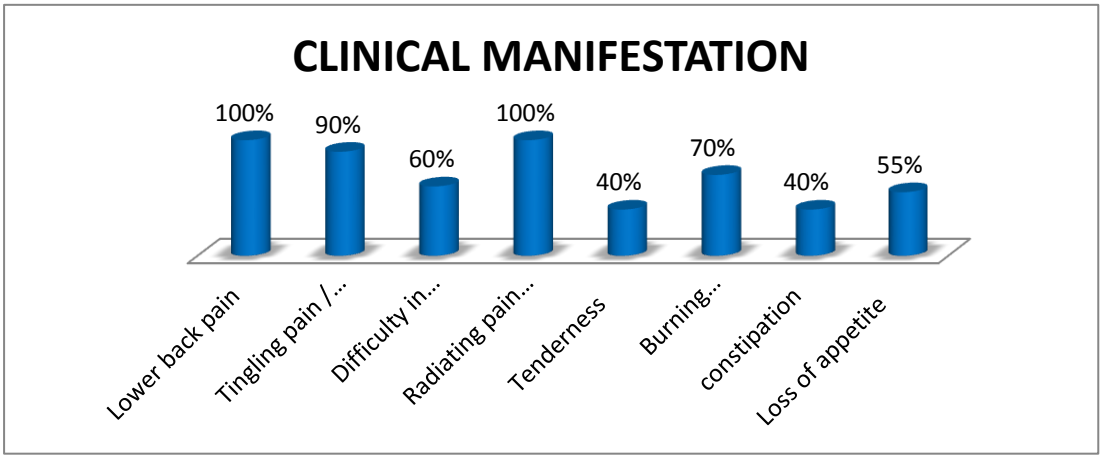


Inference:

Out of 20 patients, 8 patients (40%) belongs to below 6 months, 4 patients (20%) were belongs to 6 months to 1 year and 4 cases (20%) had 1 year to 2 years, 4 patients (20%) were belongs to 2 years above.

11. CLINICAL MANIFESTATION

S.NO	CLINICAL MANIFESTATION	NO OF CASES	PERCENTAGE (%)
1.	Lower back pain	20	100%
2.	Tingling pain / Numbness	18	90%
3.	Difficulty in moving the leg	12	60%
4.	Radiating pain to back and lower limbs	20	100%
5.	Tenderness	8	40%
6.	Burning sensation	14	70%
7.	Constipation	8	40%
8.	Loss of appetite	11	55%



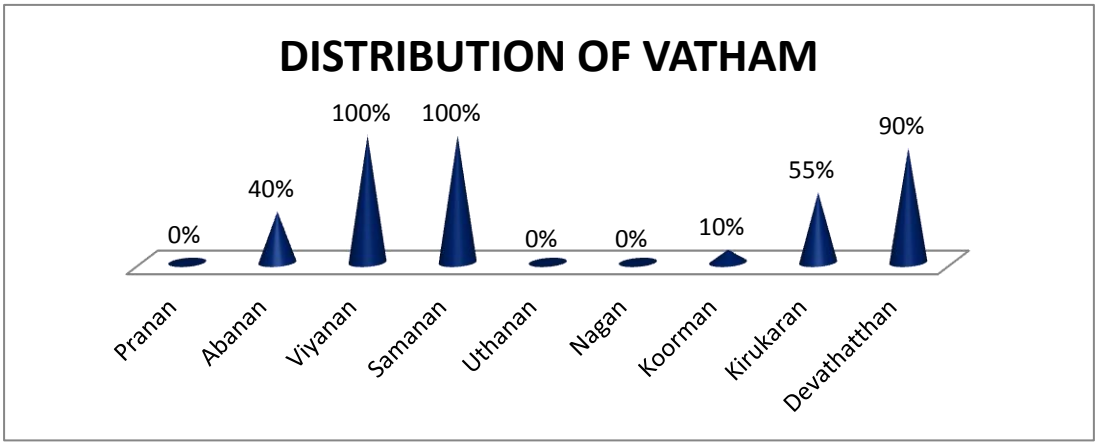
Inference:

In respect of the patients with Sciatica, the clinical manifestation of Low back pain, Radiating pain to back and lower limbs were present in all cases. Tingling pain / Numbness were present in 18 cases (90%), Burning sensation had present in 14 cases (70%), Difficulty moving in the leg were present in 12 cases (60%), Tenderness were present in 8 cases (40%), Constipation in 8 patients (40%) and Loss of appetite in 11 cases (55%).

12. MUKKUTRAM

DISTRIBUTION OF VATHAM

S.NO	TYPES OF VAATHAM	NO. OF CASES	PERCENTAGE
1.	Pranan	0	0%
2.	Abanan	8	40%
3.	Viyanan	20	100%
4.	Samanan	20	100%
5.	Uthanan	0	0%
6.	Nagan	0	0%
7.	Koorman	2	10%
8.	Kirukaran	11	55%
9.	Devathatthan	18	90%
10.	Thananjeyan	-	-

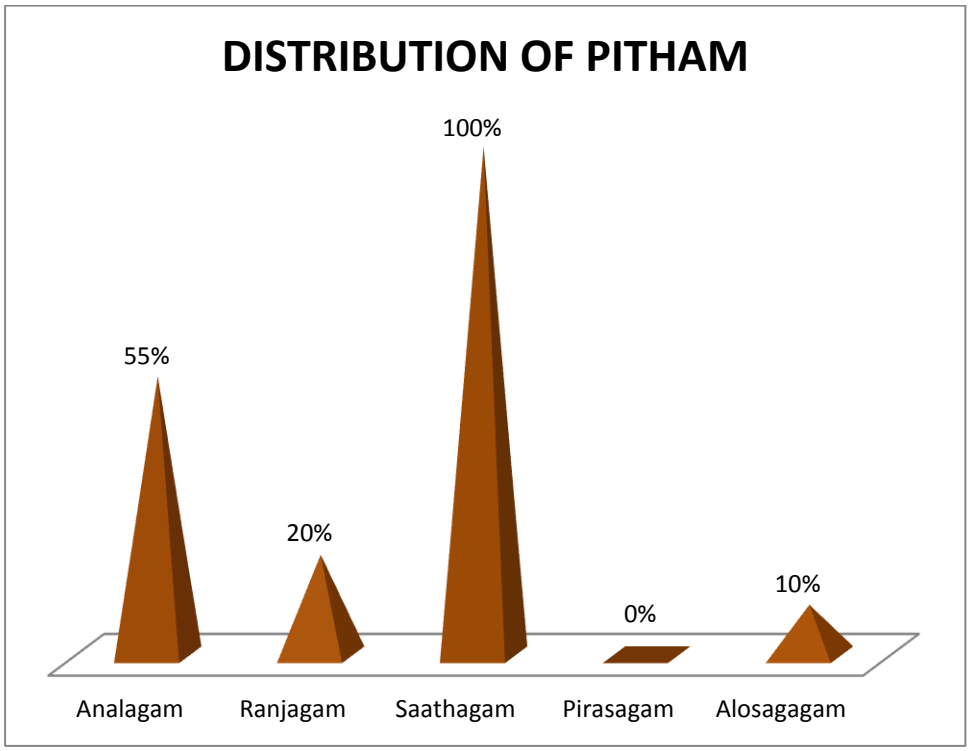


Inference:

According to classification of Vatham, derangement of Viyanan and Samanan. 8 patients (40%) was affected with Abanan, 11 patients (55%) was affected with Kirukaran, 18 patients (90%) was affected with devathatthan, 2 patients (10%) was affected with Koorman and none affected with Pranan, Uthanan, Naagan and Thananjeyan.

13. DISTRIBUTION OF PITHAM

S.NO	PITHAM	NO OF CASES	PERCENTAGE (%)
1.	Analagam	11	55%
2.	Ranjagam	4	20%
3.	Saathagam	20	100%
4.	Pirasagam	0	0%
5.	Alosagagam	2	10%

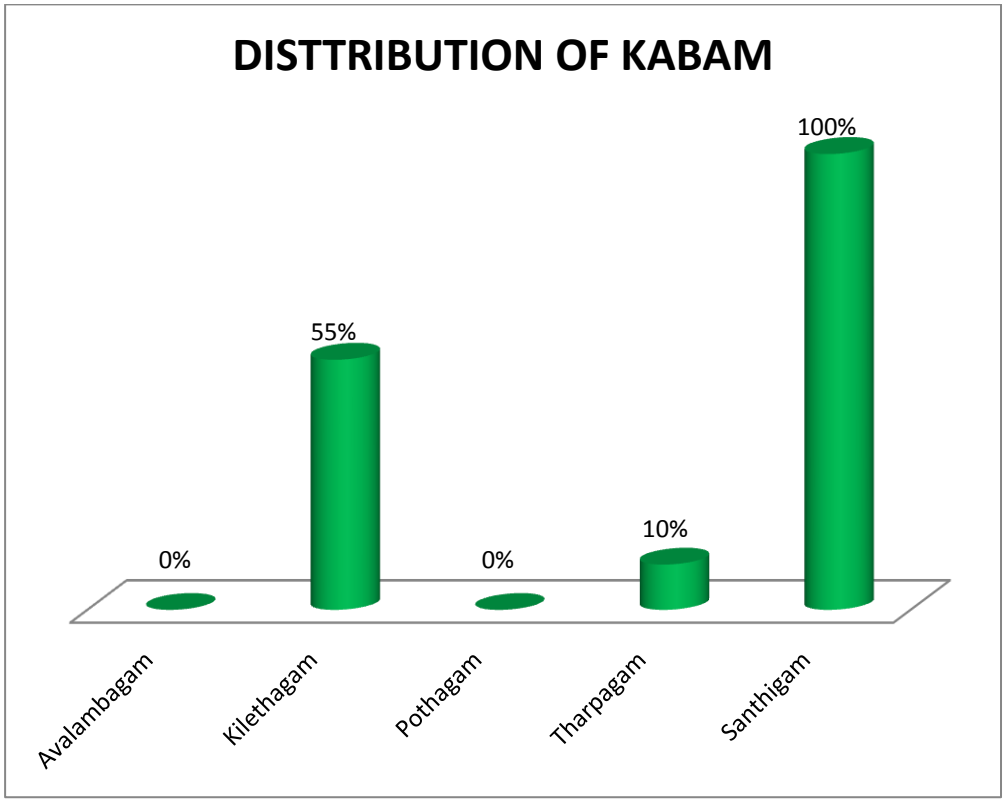


Inference:

According to Pitham 20 cases (100%) were affected derangement of Saathgam, 11 cases (55%) was affected Analagam, 4 cases (20%) was affected with Ranjagam and 2 cases (10%) was affected with Alosagam.

14. DISTTRIBUTION OF KABAM

S.NO	KABAM	NO OF CASES	PERCENTAGE (%)
1.	Avalambagam	0	0%
2.	Kilethagam	11	55%
3.	Pothagam	0	0%
4.	Tharpagam	2	10%
5.	Santhigam	20	100%

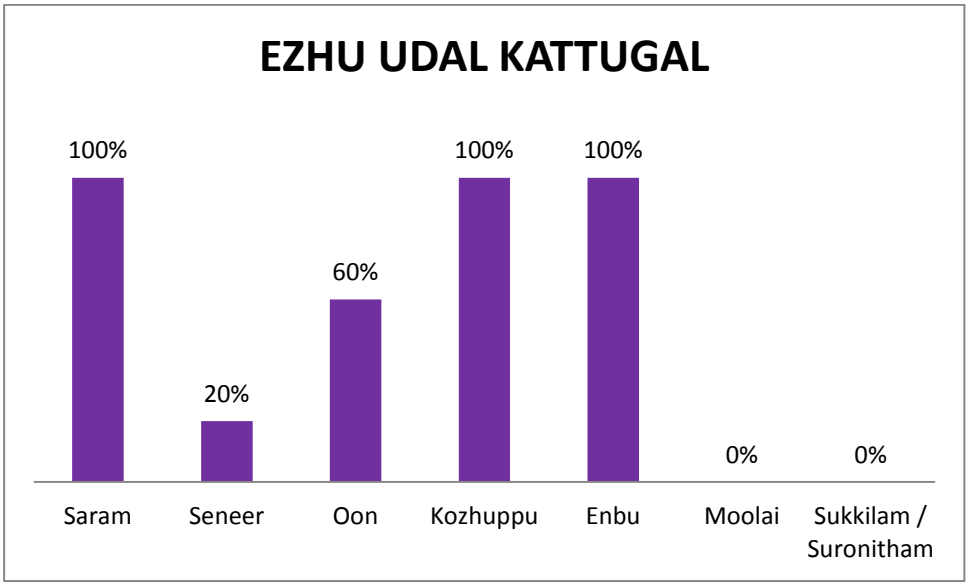


Inference:

According to the study, all cases (20) (100%) affected by Santhigam, 11 cases (55%) affected by Kilethagam and 2 cases (10%) affected by Tharpagam.

14. EZHU UDAL KATTUGAL

S.NO	EZHU UDAL THATHUKKAL	NO. OF CASES	PERCENTAGE (%)
1.	Saram	20	100%
2.	Seneer	4	20%
3.	Oon	12	60%
4.	Kozhuppu	20	100%
5.	Enbu	20	100%
6.	Moolai	0	0%
7.	Sukkilam / Suronitham	0	0%

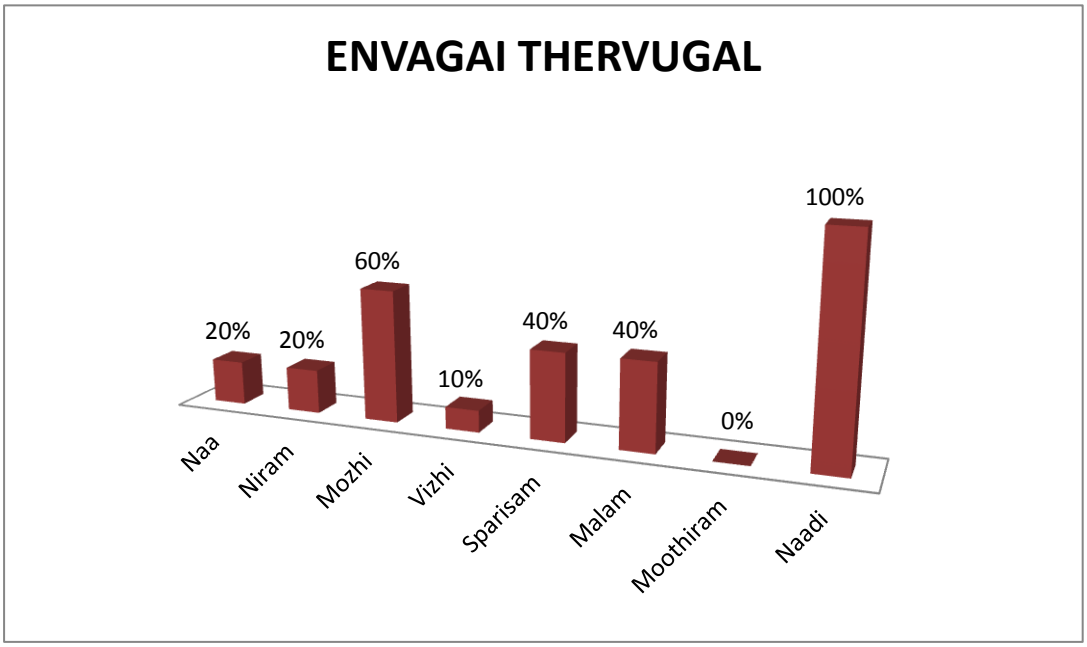


Inference:

From the above chart, we observe that Saaram, Kozhuppu, Enbu were affected in all the patients (100%), Oon was affected in 12 cases (60%), Seneer were affected in 4 patients (20%). None affected with Moolai and Sukkilam / Suronitham

15. ENVAGAI THERVUGAL

S.No	EN VAGAI THERVUGAL	NUMBER OF CASES	PERCENTAGE (%)
1	Naa	4	20%
2	Niram	4	20%
3	Mozhi	12	60%
4	Vizhi	2	10%
5	Sparisam	8	40%
6	Malam	8	40%
7	Moothiram	0	0%
8	Naadi	20	100%

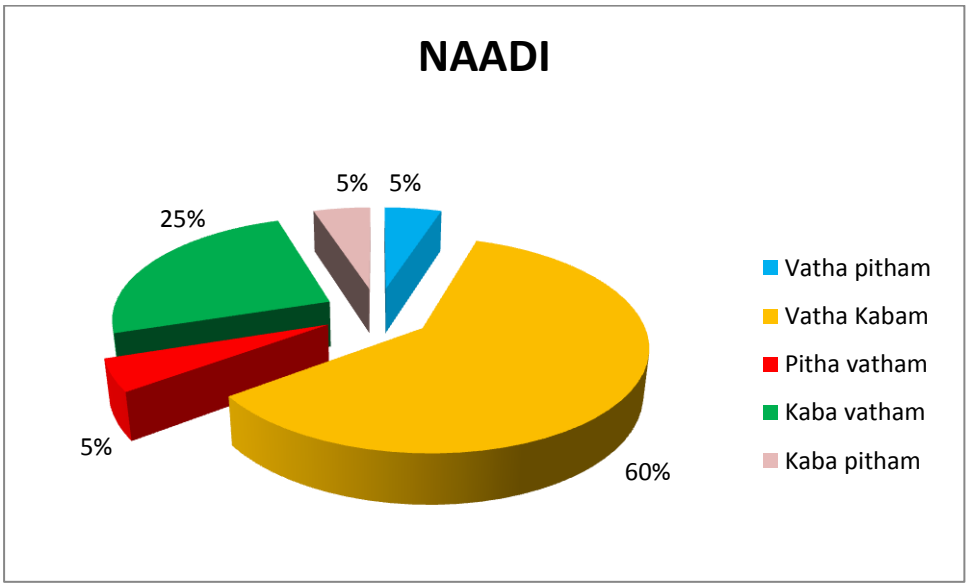


Inference:

According to Envagai thervugal Naa was affected in 4 patients (20%), Niram was affected in 4 patients (20%), Mozhi was affected in 12 patients (60%), Vizhi was affected in 2 patients (10%), Sparisam was affected in 8 patients (40%), Malam was affected in 8 patients (20%), Naadi was affected in for all the 20 patients.

16. NAADI

S.NO	TYPES OF NAADI	NO OF CASES	PERCENTAGE(%)
1.	Vatha pitham	1	5%
2.	Vatha Kabam	12	60%
3.	Pitha vatham	1	5%
4.	Kaba vatham	5	25%
5.	Kaba pitham	1	5%

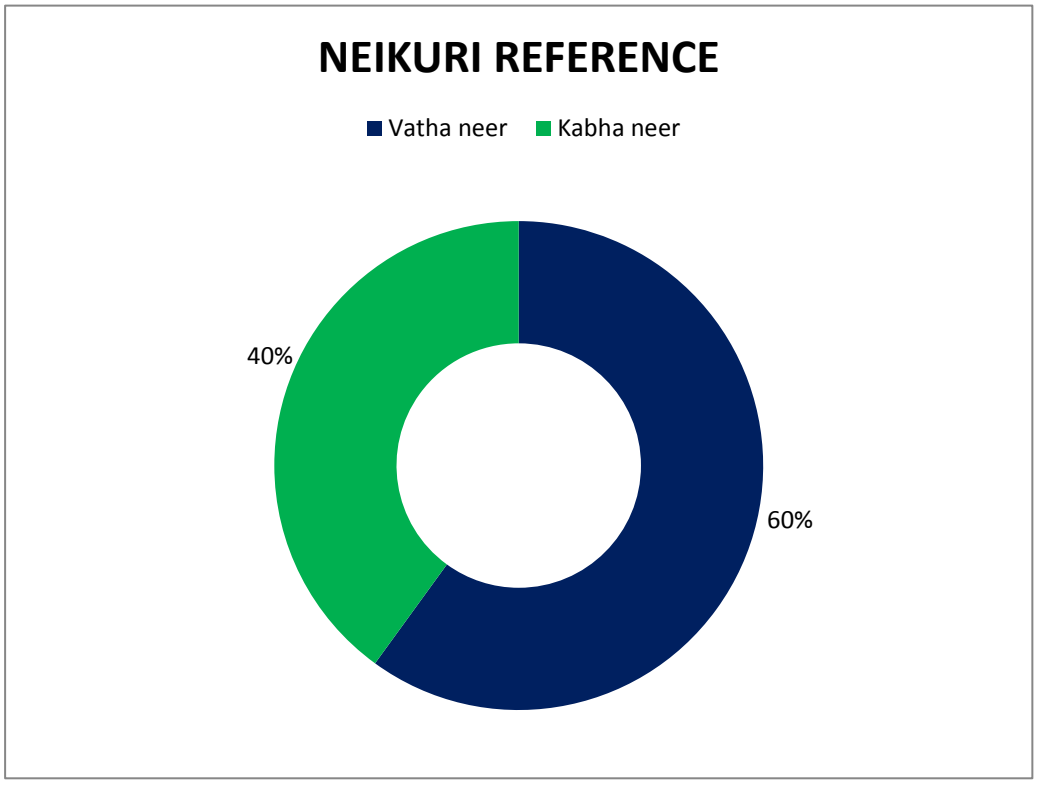


Inference:

Out of 20 patients, 12 patients (60%) had Vatha Kabam, 5 patients (25%) had Kaba Vatham, 1 patient (5%) Vatha Pitham, 1 patient (5%) Pitha Vatham and 1 patient (5%) Kaba Pitham.

17. NEIKURI REFERENCE

S.No	THATHU	NEIKURI	NUMBER OF CASES	PERCENTAGE (%)
1	Vatha neer	Spread like snake	12	60%
2	Kabha neer	Spread like pearl	8	40%

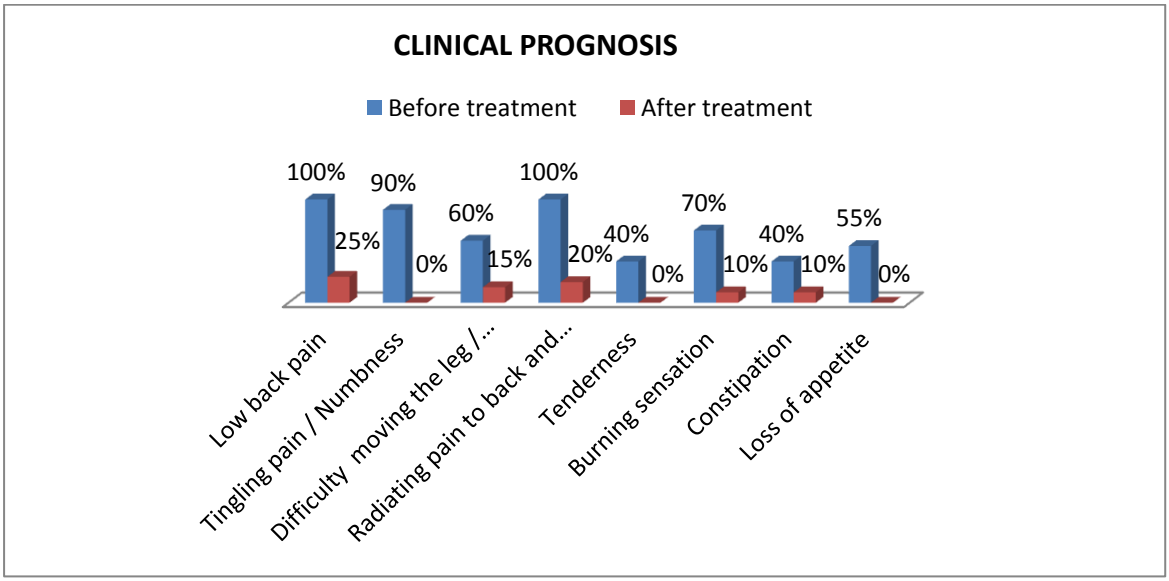


Inference:

Out of 20 patients (60%) had Vatha Neer, 8 patients (40%) had Pitha Neer.

18. RESULT AFTER TREATMENT CLINICAL PROGNOSIS

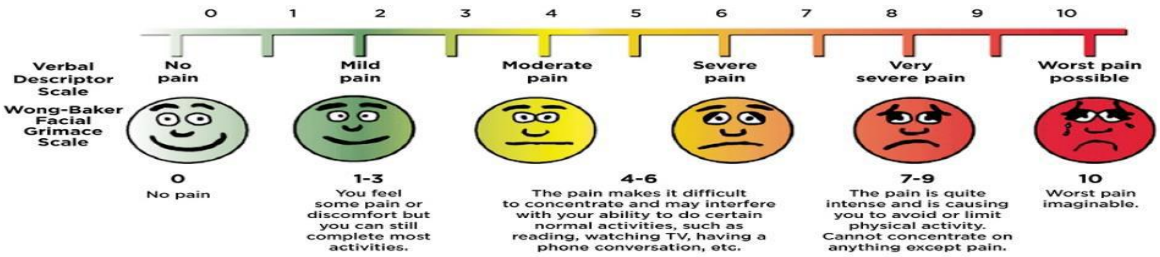
S. NO	CLINICAL MANIFESTATION	BEFORE TREATMENT		AFTER TREATMENT		IMPROVEMENT	
		NO OF CASES	(%)	NO OF CASES	(%)	NO OF CASES	(%)
1.	Low back pain	20	100%	5	25%	15	75%
2.	Tingling pain /numbness	18	90%	0	0%	18	100%
3.	Difficulty moving the leg / foot	12	60%	3	15%	9	45%
4.	Radiating pain to back and lower limb	20	100%	4	20%	16	80%
5.	Tenderness	8	40%	0	0%	8	100%
6.	Burning sensation	14	70%	2	10%	12	60%
7.	Constipation	8	40%	2	10%	6	30%
8.	Loss of appetite	11	55%	0	0%	11	100%



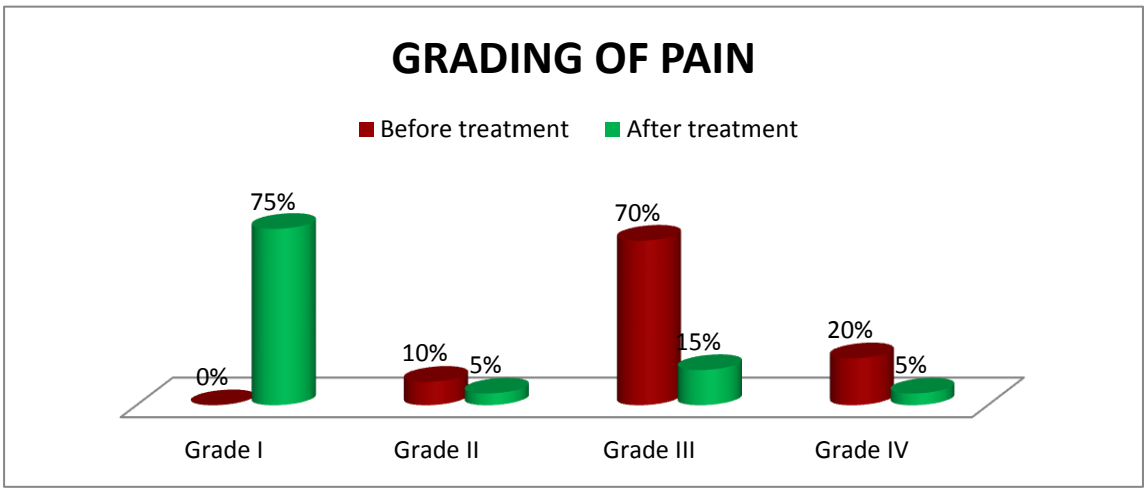
Inference:

The clinical signs and symptoms were improved after treatment,showing only 5 cases (25%) had Low back pain, 3 cases (15%) had Difficulty in moving the leg, 4 cases (20%) had Radiating pain to back and lower limbs, 2 cases (10%) had Burning sensation, 2 cases (10%) had constipation.

19. GRADING OF PAIN



S.NO	NAME OF THE GRADE	BEFORE TREATMENT		AFTER TREATMENT	
		NO OF CASES	(%)	NO OF CASES	(%)
1.	No pain Grade I	0	0%	15	75%
2.	Mild pain Grade II	2	10%	1	5%
3.	Moderate pain Grade III	14	70%	3	15%
4.	Severe pain Grade IV	4	20%	1	5%

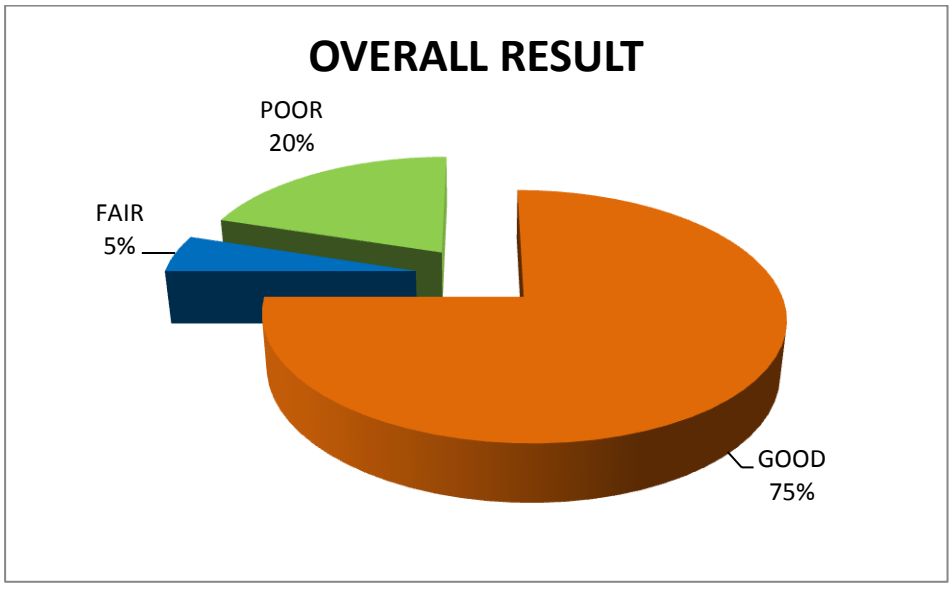


Inference :

Out of 20 patients, 15 cases (75%) had no pain,1 cases (5%) had mild pain, 3 cases (15%) had moderate pain and 1 cases (5%) had severe pain at the end of the treatment.

20. OVERALL RESULT

S.NO	RESULTS	NO OF CASES	PERCENTAGE (%)
1.	GOOD	15	75%
2.	FAIR	1	5%
3.	POOR	4	20%



Inference:

Out of 20 cases, 15 cases (75%) had good results, 1 cases (5%) had fair result and 4 cases (20%) had poor result.

LABORATORY INVESTIGATION REPORT
BEFORE TREATMENT

S.No	OP No	Age / Sex	Haematological report							RFT		Urine Analysis		
			TC cells/ cu.mm	DC %			ESRmm		Hb gms%	Urea mg/dl	Creatinine mg/dl	Alb	Sug	Dep
				P	L	E	½ hr	1 hr						
1.	9679	36/F	6200	54	42	4	25	42	9.6	25	1.2	Nil	Nil	1-2
2.	2094	38/M	7300	60	34	6	3	7	13.4	29	1.0	Nil	Nil	Opc
3.	4692	34/F	8200	57	40	3	7	15	14.6	24	0.7	Nil	Nil	Oec
4.	5308	42/F	9100	66	25	9	12	25	9.9	18	0.9	Nil	Nil	Opc
5.	8937	34/M	8100	64	33	3	5	12	10.6	27	0.7	Nil	Nil	Opc
6.	1435	45/F	6700	56	36	8	16	25	12.4	30	0.9	Nil	Nil	Oec
7.	5300	45/M	7000	60	32	8	8	17	16.5	28	0.6	Nil	Nil	Nil
8.	1749	38/M	8600	65	32	3	2	5	11.2	28	0.7	Nil	Nil	Nil
9.	6018	26/F	10300	63	32	5	4	10	13.3	22	0.5	Nil	Nil	Opc
10.	7127	33/F	14200	72	24	4	40	78	11.9	21	0.7	Nil	Nil	Opc
11.	8597	47/M	8500	62	35	3	12	28	8.5	20	0.8	Nil	Nil	Opc
12.	8555	56/F	9400	55	42	3	7	15	13	23	1.1	Nil	Nil	Oec
13.	8914	55/F	6700	65	29	6	12	40	12.5	20	0.4	Nil	+	Oec
14.	9923	48/F	8500	59	33	8	8	14	7.1	15	0.6	Nil	Nil	Opc
15.	4847	41/F	9500	58	34	8	5	15	13.4	22	0.9	+	++	Opc
16.	5190	40/F	6900	61	34	5	25	40	9.7	22	0.7	Nil	Nil	Oec
17.	6451	49/F	11700	76	17	7	2	10	14.6	36	0.7	Nil	+	Oec
18.	7114	54/M	8200	62	36	2	4	10	14.4	22	0.8	Nil	Nil	Oec
19.	3578	46/M	5900	43	49	8	2	5	15.4	20	0.4	Nil	+	Opc
20.	3515	27/M	9000	57	39	4	5	11	13	32	1.0	Nil	Nil	Opc

C – Total count, DC – Differential count, P – Polymorphs, L – Lymphocyte, E – Eosinophil, ESR – Erythrocyte Sedimentation Rate, Oec – Occasional epithelial cells, Opc – Occasional pus cells, Alb – Albumin, Sug – Sugar, Dep – Deposits

LABORATORY INVESTIGATION REPORT
AFTER TREATMENT

S.No	OP.No	Age/Sex	Haematological report							RFT		Urine Analysis		
			TC cells/ cu.mm	DC %			ESR		Hb gms%	Urea mg/ dl	Creatinine mg/dl	Alb	Sug	Dep
				P	L	E	½ hr	1 hr						
1	9679	36/F	8600	63	35	2	18	24	10.5	21	1.0	Nil	Nil	Nil
2	2094	38/M	8400	64	32	4	3	7	14.2	24	0.9	Nil	Nil	Nil
3	4692	34/F	8200	59	38	3	6	15	14.6	24	0.7	Nil	Nil	Nil
4	5308	42/F	9400	64	30	6	10	18	10.8	16	0.6	Nil	Nil	Nil
5	8937	34/M	8300	62	34	3	12	18	13	21	0.7	Nil	Nil	Nil
6	1435	45/F	8500	62	33	5	3	7	10.6	24	0.5	Nil	Nil	Nil
7	5300	45/M	8200	65	34	1	6	12	15.9	25	0.4	Nil	Nil	Nil
8	1749	38/M	8500	65	32	3	2	5	11.2	26	0.6	Nil	Nil	Nil
9	6018	26/F	9900	60	37	3	22	31	13.9	18	0.5	Nil	Nil	Opc
10	7127	33/F	12030	66	32	2	10	24	12.5	23	0.5	Nil	Nil	Opc
11	8597	47/M	8700	62	35	3	12	28	10.5	18	0.7	Nil	Nil	Nil
12	8555	56/F	9700	55	42	3	7	15	13.5	20	0.6	Nil	Nil	Nil
13	8914	55/F	8400	62	34	4	2	5	13	17	0.4	Nil	Nil	Nil
14	9923	48/F	8900	64	31	5	3	7	9.2	13	0.5	Nil	Nil	Nil
15	4847	41/F	8400	52	44	4	18	24	13.4	18	0.6	Nil	Nil	Nil
16	5190	40/F	8600	70	28	2	2	6	10.2	16	0.4	Nil	Nil	Opc
17	6451	49/F	10600	70	26	4	2	6	13	24	0.8	Nil	+	Oec
18	7114	54/M	8800	61	34	5	4	10	14.9	20	0.7	Nil	Nil	Nil
19	3578	46/M	6800	62	36	2	3	7	16	18	0.4	Nil	+	Opc
20	3515	27/M	9200	59	37	4	5	10	13.5	28	0.9	Nil	Nil	Nil

TC – Total count, DC – Differential count, P – Polymorphs, L – Lymphocyte, E – Eosinophil, ESR – Erythrocyte Sedimentation Rate, Oec – Occasional epithelial cells, Opc – Occasional pus cells, Alb – Albumin, Sug – Sugar, Dep – Deposits

CASE SUMMARY OF OUT PATIENTS

S.No	OP No	Age / Sex	Date of Istvisit	Date of last visit	No . of days treated	Results
1.	9679	36/F	12- Sep-16	26-Oct-16	46 days	Moderate
2.	2094	38/M	21-Sep-16	3-Nov-16	44 days	Good
3.	4692	34/F	1-Oct-16	13-Nov-16	48 days	Good
4.	5308	42/F	3-Oct-16	19-Nov-16	48 days	Good
5.	8937	34/M	17-Oct-16	30-Nov-16	45 days	Good
6.	1435	45/F	26-Oct-16	10-Dec-16	46 days	Poor
7.	5300	45/M	11-Nov-16	29-Dec-16	48 days	Good
8.	1749	38/M	5-Dec-16	22-Jan-17	48 days	Good
9.	6018	26/F	26-Dec-16	11-Feb-17	47 days	Poor
10.	7127	33/F	29-Dec-16	14-Feb-17	48 days	Good
11.	8597	47/M	4-Jan-17	19-Feb-17	48 days	Good
12.	8555	56/F	4-Jan-17	17-Feb-17	45 days	Poor
13.	8914	55/F	5-Jan-17	22-Feb-17	48 days	Good
14.	9923	48/F	9-Jan-17	26-Feb-17	45 days	Good
15.	4847	41/F	31-Jan-17	21-Mar-17	48 days	Good
16.	5190	40/F	1-Feb-17	20-Mar-17	48 days	Good
17.	6451	49/F	6-Feb-17	25-Mar-17	49 days	Good
18.	7114	54/M	8-Feb-17	27-Mar-17	48 days	Poor
19.	3578	46/M	3-Mar-17	19-Apr-17	48 days	Good
20.	3515	27/M	3-Mar-17	20-Apr-17	49 days	Good

LABARATORY INVESTIGATIONS OP –

BEFORE AND AFTER TREATMENT

S. No	OP No	AGE/ SEX	BLOOD GLUCOSE (F) BEFORE TREATMENT			BLOOD GLUCOSE (PP) AFTER TREATMENT			TOTAL CHOLESTEROL	
			F	PP	R	F	PP	R	BT	AT
1	9679	36/F	90	116	-	85	110	-	165	138
2	2094	38/M	108	122	-	105	126	-	160	125
3	4692	34/F	93	115	-	102	126	-	146	140
4	5308	42/F	86	126	-	93	129	-	165	141
5	8937	34/M	108	129	-	115	130	-	101	129
6	1435	45/F	94	151	-	108	132	-	111	108
7	5300	45/M	83	99	-	86	115	-	174	168
8	1749	38/M	88	128	-	100	126	-	118	138
9	6018	26/F	101	105	-	85	115	-	160	124
10	7127	33/F	-	-	135	-	-	116	166	124
11	8597	47/M	87	103	-	85	118	-	165	128
12	8555	56/F	89	95	-	86	128	-	227	120
13	8914	55/F	132	242	-	110	208	-	176	128
14	9923	48/F	110	120	-	85	126	-	126	128
15	4847	41/F	168	231	-	140	192	-	227	142
16	5190	40/F	90	115	-	105	134	-	176	119
17	6451	49/F	99	90	-	115	132	-	130	120
18	7114	54/M	116	115	-	120	124	-	231	132
19	3578	46/M	92	84	-	96	115	-	180	84
20	3515	27/M	102	102	-	106	119	-	128	121

PAIN SCORE – OP PATIENTS

S. No	OP No	AGE/SEX	LUMBAR PAIN		RADIATING PAIN	
			BT	AT	BT	AT
1	9679	36/F	5	3	6	3
2	2094	38/M	4	0	5	0
3	4692	34/F	3	0	6	0
4	5308	42/F	5	0	6	0
5	8937	34/M	4	4	7	4
6	1435	45/F	6	0	5	0
7	5300	45/M	5	0	5	0
8	1749	38/M	4	4	8	4
9	6018	26/F	5	0	7	0
10	7127	33/F	3	0	5	0
11	8597	47/M	6	0	4	0
12	8555	56/F	4	0	6	0
13	8914	55/F	7	6	5	3
14	9923	48/F	5	0	9	0
15	4847	41/F	6	0	4	0
16	5190	40/F	4	0	6	0
17	6451	49/F	7	4	2	2
18	7114	54/M	3	0	9	0
19	3578	46/M	5	0	6	0
20	3515	27/M	6	0	6	0

DISCUSSION

Vathasthambam, a clinical entity described by Yugimunivar in his YUGI VAIDHYA CHINTHAMANI is one among the 80 types of Vatha diseases. The classical clinical features are Weakness, Numbness, Tingling pain in the leg.

Sciatica is relatively common condition with a lifetime incidence varying from 13% to 40%. Large populations are suffering from this disease. But they are not completely relieved from their symptoms by other systems of medicine. Hence with the help of trail medicine from Siddha system, results and observations are noted for this study.

The patients were examined base on Siddha and as well as modern aspects.

All the necessary investigations were made during the study. The results obtained from their studies were discussed below for better conclusion.

Trial medicine administered was *Ayakaantha chendhooram* – 130 mg 2 times a day with chukku powder after food for 48 days.

20 cases were selected and admitted in the In- patient ward of Arignar Anna Government Hospital of Indian Medicine attached to Government Siddha Medical College, Arumbakkam, Chennai – 106 during the period of 2015 – 2017.All necessary investigations were carried out to all patients and trail drug were given. Daily follow up were done. All the patients were strictly advised to follow diet restriction and peaceful lifestyle to normalize the immune mechanism.

Drug authetication:

I have got a drug authentication of metals sample of specimen is collected from Naagarkovil like Iron, Magnetic oxide of iron from Department of Pharmacology and freshly specimens of *Sphaeranthus amaranthoides, Alternanthera sessilis* were specimen is collected from farm near nativity and its organoleptic characters, Microscopic and Macroscopic examination was conducted and authenticated by botanist.Dept, of Medicinal Botany, Govt. Siddha Medical College, Arumbakkam, Chennai – 106.

Pre clinical screenings:

Physicochemical analysis:

Loss on Drying (at 105^0C) was 0.165%,

The total ash value 99.48%,

The water soluble ash value was 2.22%.

The acid soluble ash value was 11.46%.

pH value was 3.7%.

IAEC:

IAEC NO: SU / CLATR / IAEC / IV / 015 / 2016.

Toxicity study:

Acute toxicity:

Acute and sub acute toxicity studies were conducted on experimental rats at Sathyabama University, Chennai, Tamilnadu.

Acute toxicity study of the drug Ayakaantha chendhooram with chukku powder was carried out as the OECD guideline - 423 (Organisation to Econamic Co-operation and Development).

The acute toxicity study of my trial drug was studied and the drug was proved safer for long term administration, as it did not exhibit any significant toxicity at 2000 mg / kg body weight.

Sub acute toxicity:

Sub acute toxicity study as per the guideline of – 407. Under the dosage of trial drug 200mg / kg (Low dose), 400mg / kg (High dose) it did not exhibit any significant.

Histo pathology:

At the end of toxicity studies the animal were sacrificed and they were subjected to hematological parameters (TC, DC & Hb) chemical parameters (LFT, RFT) and histopathology of vital organs like Liver, Kidney, Spleen, Lungs were carried out. The studied did not exhibit the evidence of remarkable pathological lesions in the tissues.

Pharmacological activity:

The pharmacology studies of trial medicine *Ayakaantha chendhooram* showed significant analgesic action in wister rats.

The analgesic activity of Ayakaantha chendhooram was carried out by producing the constriction injury induced neropathic pain in wister rats through Eddy' s hot plate method. Then trial drug was administrated shows a potent analgesic activity during the studies.

The result of preclinical screening, the result of chemical analysis, Toxicological studies, Pharmacological studies were shown in anexures.

Biochemical analysis:

The Ayakaantha chendhooram contains of Chlorides, Phosphate, Iron, Calcium, Potassium and Alkaloids.

IEC, CTRI:

Study Design

The study was approved by Institutional Ethics Committee (IEC) and the approval number is **GSMC – CH – ME – 4 / 2015 / 008**.It was registered in **Clinical Trials Registry – India (CTRI)** and the registration number is **CTRI/ 2017 / 05 / 008575.**

Population and sample :

The population consists of all patients satisfying the inclusion and exclusion criteria mentioned below. Sample consists of VATHASTHAMBAM patients who were attending the OPD of Arignar Anna Hospital, Arumbakkam, Chennai – 106.

Sample Size : The trial size will be 20 patients.

Clinical study:

All the necessary investication were carried out to all patients and trial drug were given. Weekly once follow up were done. Total duration of treatment ranges from 48 days. All the patients were strictly advised to follow diet restriction and peaceful life style to normalize the immune mechanism.

Gender distribution:

From selected 20 cases of study 40% (8) of cases were male and 60% (12) were female.

Sciatica is most commonly affected in female.

Age distribution:

Out of 20 cases 8 patients (40%) were between 41 – 50 years, 7 patients (35%) were between 31 – 40 years, 3 patients (15%) were between 51 – 60 years.

High incidences of cases were noted in age ranging of 41 – 50 years during the studies. The disease is more common in 4^{th} and 5^{th} decade.

Seasonal incidence:

According to Paruva kaalam highest incidence of 30% were noted in Pinpani kaalam and 25% cases were noted in Kaar kaalam and 25% comes under Munpani kaalam , 20% of cases were noted in Koothir kaalam.

When clinical trial of 20 cases were enquired about the seasonal link, most of the cases were in Pinpani Kaalam due to seasonal variation.

"கார்காலக் குணந் தன்னைக் கருதியுரைத் திடக்கேளாய்

பசிமந்தம் வாதமிக லாங்குளிருண் டாகும்".

சித்தமருத்துவாங்க சுருக்கம், பக்கம் 270.

Occupational status:

From selected 20 cases, 9 patients (45%) were house wife, 6 patients (30%) were coolies, 5 patients (25%) were office workers.

Excessive workload and emotional stress is the main causes of Vatha disease.

Mixed catagories of people are affected from housewife, working women.

Socio economic status:

Recording Socio Economic Status 13 patients (65%) were low income and 5 cases (25%) from middle income and 2 cases (10%) from high income.

The people living in poor Socio Economic Status were more affected because of life style and environmental factors.

Diet reference:

Out of 20 cases, most of the cases 17 (85%) were taken mixed diet, and 3 cases (15%) had vegetarian diet only.

Thinai distribution:

According to the study,all 20 cases (100%) were from Neithal thinai , Neithal nilam is more prone to Vatha disease. Already author described the of disease was more in Neithal nilam as said by Siddhars,

"நெய்தனில மேலுப்பை நீங்கா துறினுமது

வெய்தனில மே தங்கு வீடாகும்".

- சித்த மருத்துவாங்க சுருக்கம், பக்கம் 256.

Yaakkai reference:

According to the study, nearly 8 cases (40%) have Vatha pitha yaakkai, 4 cases (20%) have Vatha kaba yaakkai, 4 cases (20%) have Pitha vatha yaakkai, 2 cases (10%) have Pitha kaba yaakkai, 2 case (10%) have Kaba vatha yaakkai.

The disease is caused by exacerbation of Vatha humor by cold induced food and habit. So the persons who are having Vatha yakkai are more affected.

Duration of illness prior to treatment:

Out of 20 patients, 8 patients (40%) belongs to below 6 months, 4 patients (20%) were belongs to 6 months to 1 year and 4 cases (20%) had 1 year to 2 years, 4 patients (20%) were belongs to 2 years above.

Clinical manifestation:

In respect of the patients with Sciatica, the clinical manifestation of Low back pain, Radiating pain to back and lower limbs were present in all cases. Tingling pain / Numbness were present in 18 cases (90%), Burning sensation had present in 14 cases (70%), Difficulty moving in the leg were present in 12 cases (60%), Tenderness were present in 8 cases (40%), Constipation in 8 patients (40%) and Loss of appetite in 11 cases (55%).

Mukkutram:

Distribution of vatham:

According to classification of Vatham, derangement of Viyanan and Samanan. 8 patients (40%) was affected with Abanan, 11 patients (55%) was affected with Kirukaran, 18 patients (90%) was affected with devathatthan, 2 patients (10%) was affected with Koorman and none affected with Pranan, Uthanan, Naagan and Thananjeyan.

- As Viyanan is a main constituent in flexion and extention movements,affected viyanan produce difficulty in movements.
- Affected Abanan produced constipation.
- Affected Kirukaran produced loss of appetite.

Distribution of pitham:

According to Pitham 20 cases (100%) were affected derangement of Saathgam, 11 cases (55%) was affected Analagam, 4 cases (20%) was affected with Ranjagam and 2 cases (10%) was affected with Alosagam.

- Affected analagam produced loss of appetite.
- All the cases were unable to carryout regular works properly. Sathagam indicates this one. So 100% were affected in Sathaga pitham.
- Affected Ranjagam produced pallor of skin, eye and reduced hemoglobin.
- Affected Alosagam produced impairement of eye sight.

Disttribution of kabam:

According to the study, all cases (20) (100%) affected by Santhigam, 11 cases (55%) affected by Klethagam and 2 cases (10%) affected by Tharpagam.

- Santhigam iyam gives stability, lubrication and movements of joints.
- Affected Santhigam produced low back pain.
- Affected Klethagam produced loss of appetite.
- Affected Tharpagam produced impairement of eye sight.

Ezhu udal kattugal:

From the above chart, we observe that Saaram, Kozhuppu, Enbu were affected in all the patients (100%), Oon was affected in 12 cases (60%), Seneer were affected in 4 patients (20%). None affected with Moolai and Sukkilam / Suronitham.

- Affected Enbu results in producing Low back ache.
- Affected Saaram results in causing Loss of appetite and tiredness.
- Seneer were affected in produced pallor of skin, eye and reduced hemoglobin.
- Oon, Kozhuppu was affected in patients due to pain, tenderness around the joint muscle.

Envagai thervugal:

According to Envagai thervugal Naa was affected in 4 patients (20%), Niram was affected in 4 patients (20%), Mozhi was affected in 12 patients (60%), Vizhi was affected in 2 patients (10%), Sparisam was affected in 8 patients (40%), Malam was affected in 8 patients (20%), Naadi was affected in for all the 20 patients.

- Naa were affected due to anaemia (pale colour).
- Niram were affected due to anaemia (pale colour).
- In Vizhi 10% of cases were affected due to 2 patients had dullness of vision.
- Mozhi were affected low pitched sound.
- Sparisam were affected due to tenderness pain, mild temperature in the joints.
- In Malam were affected due to constipation.
- Naadi was affected in all patients.

Naadi:

Out of 20 patients, 12 patients (60%) had Vatha Kabam, 5 patients (25%) had Kaba Vatham, 1 patient (5%) Vatha Pitham, 1 patient (5%) Pitha Vatham and 1 patient (5%) Kaba Pitham.

Neikuri reference:

Out of 20 patients (60%) had Vatha Neer, 8 patients (40%) had Pitha Neer.

"அணுகு நெய் பாம்பிற்காணில் அனில நோய்"

- நோய் நாடல் நோய் முதல் நாடல் திரட்டு -

Vathasthambam is a Vatha reflected disease, So the most of the cases had Vatha neer, (i.e) spread like snake.

Clinical prognosis:

The clinical signs and symptoms were improved after treatment,showing only 5 cases (25%) had Low back pain, 3 cases (15%) had Difficulty in moving the leg, 4 cases (20%) had Radiating pain to back and lower limbs, 2 cases (10%) had Burning sensation, 2 cases (10%) had constipation.

Improvement:

Among the total 20 patients all were improved Clinical symptoms before and after treatment were noted. To obtain prognosis of each clinical symptom, the following formulae was used

$$\left.\frac{\text{No. Of cases after treatment}}{\text{No. of cases before treatment}}\right\} \times 100$$

Thus the clinical trial study showed significant clinical improvement in certain clinical manifestation of Vathasthambam such as Low back pain, Radiating pain to back and lower limbs were present in all cases. Tingling pain / Numbness were present in 18 cases (90%), Burning sensation had present in 14 cases (70%), Difficulty moving in the leg were present in 12 cases (60%), Tenderness were present

in 8 cases (40%), Constipation in 8 patients (40%) and Loss of appetite in 11 cases (55%).

Investication:

In Blood tests, TC, DC, ESR, Hb% serum creatinine, blood urea were investigated.

Urine:

Albumin, Sugar, Deposit were investigated.

Special investication:

- X-ray of lumbo sacral spine AP and Lateral view
- MRI whole spine.
- In X-Ray, some of the cases had soft tissue swelling and narrowing of joint space in some patients with osteophytic changes.

Bio statistical study:

Since the p value is *p<0.05;**p<0.01 significant in all clinical manifestations. So there is significant reducing of clinical manifestations among the patients for the treatment of it is concluded that the treatment was effective and significant.

Grading of pain:

Since the p value is *p<0.05;**p<0.01 significant in all sides. So there is significant changes grades of pain among the patients for the treatment of Vathasthambam. Hence it is concluded that the treatment was effective and significant.

Over all result:

Out of the 20 cases 15 (75%) had complete pain at the end of the treatment and 1 (5%) had Fair relief, 4 cases (20%) Poor result.

SUMMARY

The clinical study on **Vathasthambam** was carried out in Post graduate department of Pothu Maruthuvam, Government Siddha Medical College, Aringar Anna Hospital, Chennai – 106 during the period of 2015-2017.

A total of 20 patients were treated in the Outpatient department. The clinical and pathological assessment was carried out on the basis of Siddha and Modern aspects.

All the patients were treated with ***Ayakaantha chendhooram*** with chukku powder 130 mg b.d daily, after food for duration of 48days.

- Females were mostly affected (60%).
- Most of the patients were in the age group between 41-50 years (40%)
- Most of the patients were from Neithal Thinai (100%).
- The disease is more common in house wives (45%), so high incidence occurs in women.
- Most of the patients were affected in Pinpanikaalam (30%).
- The diseases is more common in Vathapitham yakkai cases (40%).
- In Vali, Abanan (40%), Viyanan (100%), Samanan (100%), Koorman (10%) and Devadhathan (90%) was affected.
- In Azhal, Analagam (55%) Ranjagam (20%), Saathagam (100%), Alosagam (10%), was affected.
- In Iyyam, Santhigam (100%), Kilethegam (55%) was affected.
- In Ezhu udal kattugal, Saaram (100%), Seneer (20%), Oon (60%), Kozhuppu (100%) and Enbu (100%) was affected.
- Regarding naadi, vatha kapha naadi (60%) was the most common naadi observed.
- The Toxicological studies of *Ayakaantha chendhooram* reveal no toxicity.
- The Pharmacological studies reveal that, *Ayakaantha chendhooram* has Analgesic activity.
- Bio- statistical analysis of the clinical trial reveals significant p value < 0.05 and < 0.01 and concluded that the treatment is effective and significant.

- Regarding grading of the result, 15 patients (75%) showed good improvement, 1 patients (5%) showed fair improvement, 4 patients (20%) showed poor improvement.

CONCLUSION

- ***Vathasthambam*** (Sciatica) is mainly due to the derangement of Vatha kutram.
- The trial medicine, *Ayakaantha chendhooram* along with chukku powder which is predominant in sour taste, neutralizes the increased Vatham, thereby it acts on ETHURURAI MARUTHUVAM.
- The ***Ayakaantha chendhooram*** reveals no toxicity in the preclinical studies and hence proved to be safe for human administration.
- From the pre clinical pharmacological study it is evident that, *Ayakaantha chendhooram* has significant analgesic activity.
- No adverse effect was reported during the course of the treatment.
- The *Ayakaantha chendhooram* gave maximum relief from the symptoms of *Vathasthambam.*

Hence I conclude that the *Ayakaantha chendhooram* will be a better drug that can be used in the Treatment of **vathasthambam.**

The Tamil Nadu Dr.M.G.R.Medical University

69,Anna Salai,Guindy,Chennai - 600 032.

This Certificate is awarded to Dr/~~Mr/Mrs~~.....K.R.Muthumani.....

for participating as ~~Resource Person~~ / Delegate in the Seventeenth (XVII) Workshop on

" RESEARCH METHODOLOGY & BIOSTATISTICS "

FOR AYUSH POST GRADUATES & RESEARCHERS

Organized by the Department of Siddha

The Tamil Nadu Dr. M.G.R. Medical University from 15th to 19th June 2015.

Dr.N.KABILAN, M.D.(Siddha)
READER,DEPT.OF SIDDHA

Prof. **Dr.P.ARUMUGAM,** M.D.,
REGISTRAR i/c

Prof. **Dr.D.SHANTHARAM,** M.D., D.Diab.,
VICE - CHANCELLOR

POST GRADUATE DEPARTMENT OF GUNAPADAM (PHARMACOLOGY)

GOVERNMENT SIDDHA MEDICAL COLLEGE, CHENNAI-106

IDENTIFICATION AND AUTHENTICATION CERTIFICATE

Name of the Student : KR. Muthu Mari

Department : Maruthuvam

Batch year : 2014 - 2017

Name of the sample : Ayam and Kaandham

Sample description : Dried whole plant / metal ✓ /mineral

Date of the receipt : 2.6.2016

REPORT

This sample has been critically studied with macroscopic and organoleptic characters along with relevant literature, I declared that this plant/metal/mineral material is correctly identified as FERRUM AND MAGNETIC OXIDE OF IRON and I hereby authenticate that the sample given by Dr. KR. MUTHU MARI.

This certificate issued at his/her request and is given only for dissertation purpose.

Date: 2.6.2016

Place: Chennai - 106

3/6/16

Signature with Seal

Dr. V. VELPANDIAN, M.D(s), Ph.D,
H.O.D - Department of Gunapadam,
Govt. Siddha Medical College,
Chennai - 600 106.

Government Siddha Medical College
Department of Medicinal Botany

Dr.S.Sankaranarayanan M.Sc., M.Phil., Ph.D.,
Asst. Professor
Head of the Department

6, Anna Arch Rd,
NSK Nagar,
Arumbakkam, Chennai,
Tamil Nadu 600106.

AUTHENTICATION CERTIFICATE

Based upon the organoleptic/macroscopic/microscopic examination of fresh/market sample, it is certified that the specimen given by Dr. K.R. Muthumari BSMS studying MD (S), Government Siddha Medical College, Arumbakkam, Chennai is identified below

Binomial name	Family	Regional names
Sphaeranthus amaranthoides (Burm).	Compositae	Tamil: Sivakaranthai or Narukkaranthai
Alternanthera sessilis (L.) R. Br. ex DC.	Amaranthaceae	Tamil: Ponnanganni

Dr. S. Sankaranarayanan M.Sc., M.Phil., Ph.D.,

Dr. S. SANKARANARAYANAN, M.Sc., M.Phil., Ph.D.,
Assistant Professor
Dept. of Maruthuva Thavaraiyal
(Medicinal Botany and Pharmacognosy)
Govt. Siddha Medical College,
Arumbakkam, Chennai-600 106.

GSMC/MB-08/2016

Date:03.06.2016

CERTIFICATE

This is to certify that the project entitled "**SAFETY EVALUATION OF *AYA KAANTHA CENDHOORAM* BY ACUTE TOXICITY -OECD 423 AND SUB-ACUTE REPEATED DOSE ORAL TOXICITY STUDY- OECD 407 IN RATS**" has been approved by the IAEC of Sathyabama University, Chennai.

IAEC Approval No.: **SU/CLATR/IAEC/IV/015/2016**

Animal Sanctioned: *Rattus norvegicus* / Wistar albino rats

Male: 6; Female: 12; Total: 18 (Eighteen)

Date: 5.3.2016

B. Sheela 15/3/16.

DR.B.SHEELA RANI
Chair Person

31/3/16

DR.R.ILAVARASAN
CPCSEA Main Nominee

CENTRE FOR LABORATORY ANIMAL TECHNOLOGY AND RESEARCH (CLATR) ★ SATHYABAMA UNIVERSITY Chennai - 600 119

ACUTE TOXICITY STUDY

Acute toxicity study of the study drug *chukkupowder with AyakaanthaChendhooram*was carried out as per OECD guideline (Organization for Economic Co-operation and Development) Guideline-423.

Animal

Healthy adult Wistar albino rat weighing between 170-200 g were used for the study. The animals were housed in poly propylene cages and were kept in well ventilated with 100% fresh air by air handling unit (AHU). A 12 light / dark cycle were maintained .Room temperature was maintained between 22 $\pm$ 2^0 Cand relative humidity 50–65%. They were provided with food (Sai feeds, Bangalore, India) and water *ad libitum*. All the animals were acclimatized to the laboratory for 7 days prior to the start of the study.

The experimental protocol was approved by The Institutional Animal Ethics Committee of Sathyabama University, Chennai, Tamil Nadu, India.

Acute toxicity Study

Acute toxicity study will be carried out in accordance with OECD guideline 423 [1]. The animals were fasted overnight with free access to water. The study was conducted with single oral dose administration of *chukkupowder with AyakaanthaChendhooram*.

IAEC SU/CLATR/IAEC/IV/015/2016

Animal Grouping

One group consist of 6 female rats were used for this study . The dose utilized for evaluation of acute toxicity study is about 2000 mg/kg higher than that of the therapeutic dose.

Animal Grouping

GROUP I : Animals received Test drug 2000 mg/kg (p.o)

The animals were fasted overnight (12- 16 hrs) with free access to water. The study was conducted with single oral administration of study drug *chukkupowder with AyakaanthaChendhooram* 2000mg/kg (p.o). The animals were observed continuously for first 72 h and then 14 days for emerging signs of behavioral changes, body weight changes and for mortality.

Occurrence of toxicity in animals were observed continuously for the first 4 to 24 h and observed periodically for the next 14 days. Observation includes the change in skin, fur, eyes and mucus membrane. Appearance of C.N.S,C.V.S and A.N.S related toxicity such as tremors, convulsions, sedation, steric behavior, respiratory distress, cardiovascular collapse, response to sensory stimuli, salivation, diarrhea, lethargy, sleep, coma and mortality were observed with special attention.

Body weight was recorded periodically. At the end of the experiment all animals were subjected for gross necropsy and observed for pathological changes.

SUB-ACUTE TOXICITY STUDY

Sub-acute toxicity study was carried out as per OECD guidelines Guideline-407 [2].

Animals

Healthy adult Wistar albino rat weighing between 170-200 g were used for the study. The animals were housed in poly propylene cages and were kept in well ventilated with 100% fresh air by air handling unit (AHU). A 12 light / dark cycle were maintained .Room temperature was maintained between 22 $\pm$ 2^{o} Cand relative humidity 50–65%. They were provided with food (Sai feeds, Bangalore, India) and water *ad libitum*. All the animals were acclimatized to the laboratory for 7 days prior to the start of the study.

The experimental protocol was approved by The Institutional Animal Ethics Committee of Sathyabama University, Chennai, Tamil Nadu, India.

IAEC SU/CLATR/IAEC/IV/015/2016

Animal Grouping

Animals were divided into three groups of 06 animals each consist of 3 male and 3 female rats.

GROUP I : Animals received saline 5 ml/kg b.w (p.o)

GROUP II : Animals received low dose of test drug 200 mg/kg (p.o)

GROUP III : Animals received high dose of test drug 400 mg/kg (p.o)

The animals were randomly divided into control group and drug treated groups for two different doses viz. low dose (200 mg/kg b.w) and high dose (400 mg/kg b.w).

The animals were administrated with the study drug once daily for 28 days. The animals in group I (control group) received normal saline 5 ml/kg b.w. The animals in group II received low dose of *Sukupowder with AyakaanthaChendhooram*200 mg/kg b.w(p.o) and group III received high dose of *Sukupowder with AyakaanthaChendhooram*400 mg/kg b.w(p.o).

The rats were weighed periodically and observed for signs of toxicity pertains to C.N.S, C.V.S, A.N.S including behavioral changes, food - water intake and morphological changes. At the end of 28^{th} day, the animals were fasted for overnight with free access to water. On 29^{th} day the animals were sacrificed with excess anesthesia. Blood samples were collected from aorta and stored in EDTA (ethylenediamine –tetra actate) for Hematological analysis and for serum generation for biochemical analysis.

The vital organs including heart, brain, lungs, spleen, kidneys, liver, stomach, testes, and ovary were harvested and carefully examined for gross lesions. The organs were preserved in 10% formalin for histopathological assessment and interpretation.

Hematological analysis

Blood samples were analyzed using established procedures and automated Bayer Hematology analyzer. Parameters evaluated include Packed Cell Volume (PCV), Red Blood Cells (RBC) count, White blood cell count (WBC), Platelet Count, Hemoglobin (Hb), Mean cell Haemoglobin Concentration (MCHC), Mean Red Cell Volume (MCV), Mean Cell Hemoglobin (MCH), Mean platelet volume (MPV), Neutrophils, Eosinophil's, Basophils, Lymphocytes and Monocytes.

Biochemical analysis[3]

Serum samples were analyzed for High Density Lipoprotein (HDL), Low density Lipoprotein (LDL) , Very low density Lipoprotein (VLDL) , Triglycerides (TGL), Total Cholesterol , Blood urea nitrogen (BUN), Creatinine, Albumin, Total Protein, Glucose, Uric acid, Aspartate Transaminase (AST), Alanine amino Transaminase (ALT) and Alkaline Phosphatase (ALP) using Mind ray auto analyzer model BS 120.

Histopathological evaluation[4]

Organs included of heart, brain, lungs, spleen, kidneys, liver, stomach, testes and ovary. Histological slides of organs were made and observed under the microscope. The pathological observations of cross section of these organs were performed on gross and microscopic bases. Histological examinations were performed on the preserved tissues with particular emphasis on those which showed gross pathological changes.

Statistical analysis

The statistical analysis was carried by one way ANOVA (GRAPH PAD PRISM 5 computer program). Results were expressed as mean ± standard error .A statistical comparison was carried out using the Dunnet's test for the control and treatment group

Fecal Pellet Analysis

Methodology

Rats of control and treatment group were allowed to explore to open field on clean and sterile Stainless steel tray. The collected pellets were analyzed for consistency, color, Shape, Presence of blood cells etc

Analysis	**Test Group**
Consistency	Soft
Shape	Pointed Head
Colour	Dark Green
Mucous Shedding	Absence
Blood Cells	Absent
Signs of Infection	None Observed

Sub-Acute Toxicity Study			
Analysis	**Group I**	**Group II**	**Group III**
Consistency	Soft	Soft	Soft
Shape	Oblong	Pointed Head	Pointed Head
Colour	Brownish green	Dark Green	Dark Green
Mucous Shedding	Absence	Absence	Absence
Blood Cells	Absent	Absent	Absent
Signs of Infection	None Observed	None Observed	None Observed

Muscle Grip Strength Analysis

The grip strength test is a simple non-invasive method designed to evaluate rat muscle force in vivo. Rats of control and drug treated group was allowed to hold the pull bar with both the hind limbs firmly then the animal was gently pulled back with the tail until the animal lost the grip toward the bar. The procedure was repeated to get the average value. Muscle grip ness of the drug treated group was compared to that of the control rat to ensure the change in coordination.

Metabolic Cage for Urine Collection

Rat of control and treatment group was placed individually in metabolic cage with free access to feed and water. Urine dropping from the animal was collected using specialized wire mesh system fixed at the base of the cage having provision to trap the fecal pellet mixed with urine sample. The collected urine sample was subjected to analysis with respect to colour, pH, glucose, ketone bodies, pus and blood cells.

RESULTS

Assessment of clinical signs in rats treated with *Sukupowder with AyakaanthaChendhooram*on Acute toxicity study

Parameter	**Group I**
Clinical Signs Parameters for the duration of 14 days	Test Drug 2000mg/ Kg
Number of animals observed	6 Female
Lacrimation	Absence
Salivation	Absence
Animal appearance	Normal
Tonic Movement	Absence
Clonic Movement	Absence
Laxative action	Absence
Touch Response	Normal
Response to Sound	Normal Response
Response to Light	Normal Response
Mobility	Normal Response
Respiratory Distress	Nil
Skin Color	Normal
Stereotype behavior	Absence
Piloerection	Absence
Limb Paralysis	Absence
Posture	Normal
Open field behavior	Normal
Gait Balancing	Normal
Freezing Behavior	Absent
Sings of Stress and Anxiety	None Observed
Muscular coordination	Normal

Muscle grip	Normal
Sedation **Social Behavior**	Absence Normal
Urine Analysis	No Abnormality
Urine Colour	Yellowish Orange
Urine Ph	6
Urine -Glucose	Absence
Urine -Ketones	Absence
Urine- Bilirubin	Absence
Urine-Blood Cells	Negative
Urine - Pus cells	Negative
Mortality	Nil

Quantitative data on the body weight of rats treated with *Sukupowder with AyakaanthaChendhooram*in Acute toxicity study

Group I	**Before Treatment Weight in Gms**	**After Treatment Weight in Gms**
Mean	186.2	189.8
Std. Deviation	6.014	4.309
Std. Error	2.455	1.759

Values are mean ± S.D (n = 6 per group). Control and treatment group were compared statistically using one way ANOVA followed by Dunnett's test.

Assessment of clinical signs in rats treated with *Sukupowder with AyakaanthaChendhooram*on Sub-Acute toxicity study

Parameter	**Group I**	**Group II**	**Group III**
Clinical Signs Parameters for the duration of 28 days	Control	Test Drug 200mg/ Kg	Test Drug 400mg/ Kg

Number of animals observed	3 Male and 3 Female	3 Male and 3 Female	3 Male and 3 Female
Lacrimation	Absence	Absence	Absence
Salivation	Absence	Absence	Absence
Animal appearance	Normal	Normal	Normal
Tonic Movement	Absence	Absence	Absence
Clonic Movement	Absence	Absence	Absence
Absence	Absence	Absence	Mild
Touch Response	Normal	Normal	Normal
Response to Sound	Normal Response	Normal Response	Normal Response
Response to Light	Normal Response	Normal Response	Normal Response
Mobility	Normal	Normal	Normal
Respiratory Distress	Nil	Nil	Nil
Skin Color	Normal	Normal	Normal
Stereotype behavior	Absence	Absence	Absence
Piloerection	Absence	Absence	Absence
Limb Paralysis	Absence	Absence	Absence
Posture	Normal	Normal	Normal
Open field behavior	Normal	Normal	Normal
Gait Balancing	Normal	Normal	Normal
Freezing Behaviour	Absent	Absent	Absent
Sings of Stress and Anxiety	None Observed	None Observed	None Observed
Muscular coordination	Normal	Normal	Normal
Muscle grip	Normal	Normal	Normal
Sedation	Absence	Absence	Absence
Social Behavior	Normal	Normal	Normal
Urine Analysis	No Abnormality	No Abnormality	No Abnormality
Urine Colour	Yellowish	Yellowish Orange	Yellowish Orange

Urine pH	7	6	6
Urine -Glucose	Absence	Absence	Absence
Urine -Ketones	Absence	Absence	Absence
Urine- Bilirubin	Absence	Absence	Absence
Urine-Blood Cells	Negative	Negative	Negative
Urine - Pus cells	Negative	Negative	Negative
Mortality	Nil	Nil	Nil

Effect of *Sukupowder with AyakaanthaChendhooram*on Body weight of Rats in Sub-acute toxicity study

Group I	**Before Treatment Weight in Gms**	**After Treatment Weight in Gms**
Mean	184.2	186.5
Std. Deviation	5.981	5.891
Std. Error	2.442	2.405
Group II	**Before Treatment Weight in Gms**	**After Treatment Weight in Gms**
Mean	184.3	192.7
Std. Deviation	5.164	4.546
Std. Error	2.108	1.856
Group III	**Before Treatment Weight in Gms**	**After Treatment Weight in Gms**
Mean	187	190.8
Std. Deviation	6.723	7.083
Std. Error	2.745	2.892

Values are mean ± S.D (n = 6 per group of which 3 males and 3 females). Control and treatment groups were compared statistically using one way ANOVA followed by Dunnett's test.

Quantitative data on the food and water intake of rats treated with *Sukupowder with AyakaanthaChendhooram*for 28 days in Sub-acute toxicity study

Group I	**Food intake**	**Water intake**
Mean	16.08	20.42
Std. Deviation	2.47	5.984

Std. Error	1.235	2.992
Group II	**Food intake**	**Water intake**
Mean	14.92	31
Std. Deviation	0.8333	1.414
Std. Error	0.4167	0.7071
Group III	**Food intake**	**Water intake**
Mean	14.83	33.08
Std. Deviation	3.272	1.229
Std. Error	1.636	0.6143

Values are mean ± S.D (n = 6 per group of which 3 males and 3 females). Control and treatment groups were compared statistically using one way ANOVA followed by Dunnett's test.

Effect of *Sukupowder with AyakaanthaChendhooram*on Haematology profile of rats in sub-acute toxicity study.

Group I	**WBC count ($\times 10^3$ µl)**	**RBC ($\times 10^6$ µl)**	**PLT ($\times 10^3$ µl)**	**MCV (fl)**	**MCH (pg)**	**MCHC (g/dl)**	**HGB (g/dl)**
Mean	7.983	5.683	506.2	56.35	17.98	31.78	12.04
Std. Deviation	2.408	0.9347	311.2	4.615	2.771	2.477	2.252
Std. Error	0.983	0.3816	127	1.884	1.131	1.011	0.9193
Group II	**WBC count ($\times 10^3$ µl)**	**RBC ($\times 10^6$ µl)**	**PLT ($\times 10^3$ µl)**	**MCV (fl)**	**MCH (pg)**	**MCHC (g/dl)**	**HGB (g/dl)**
Mean	10.37	5.783	624.3	58.07	21.58	31.7	11.68
Std. Deviation	1.637	0.8085	298.6	2.762	3.799	1.967	0.9847
Std. Error	0.6682	0.3301	121.9	1.127	1.551	0.8029	0.402
Group III	**WBC count ($\times 10^3$ µl)**	**RBC ($\times 10^6$ µl)**	**PLT ($\times 10^3$ µl)**	**MCV (fl)**	**MCH (pg)**	**MCHC (g/dl)**	**HGB (g/dl)**
Mean	10	6.317	473	61.93	17.98	33.42	11.77
Std. Deviation	2.433	1.072	179.3	5.211	2.735	2.249	1.742
Std. Error	0.9933	0.4377	73.19	2.128	1.117	0.9181	0.7112

Values are mean ± S.D (n = 6 per group of which 3 males and 3 females). Control and treatment groups were compared statistically using one way ANOVA followed by Dunnett's test.

Effect of *Sukupowder with AyakaanthaChendhooram*on Haematology profile of rats in sub-acute toxicity study.

Group I	**Lymph (%)**	**Mon (%)**	**Neutrophils (X 10^3/mm^3)**	**Eosinophils (%)**	**Basophils (%)**	**MPV (fl)**
Mean	75.23	2.4	2.1	1.217	0.3333	5.2
Std. Deviation	10.23	1.255	0.4	0.3061	0.5164	1.664
Std. Error	4.175	0.5125	0.1633	0.1249	0.2108	0.6792
Group II	**Lymph (%)**	**Mon (%)**	**Neutrophils (X 10^3/mm^3)**	**Eosinophils (%)**	**Basophils (%)**	**MPV (fl)**
Mean	73.68	2.05	2.05	1.567	0.3333	4.783
Std. Deviation	10.22	0.7842	0.7064	0.2503	0.5164	0.8134
Std. Error	4.171	0.3202	0.2884	0.1022	0.2108	0.3321
Group III	**Lymph (%)**	**Mon (%)**	**Neutrophils (X 10^3/mm^3)**	**Eosinophil's (%)**	**Basophils (%)**	**MPV (fl)**
Mean	72.38	3.883	3.1	1.367	0.5	5.583
Std. Deviation	8.245	1.517	0.7975	0.2422	0.5477	1.222
Std. Error	3.366	0.6194	0.3256	0.09888	0.2236	0.4989

Values are mean ± S.D (n = 6 per group of which 3 males and 3 females). Control and treatment groups were compared statistically using one way ANOVA followed by Dunnett's test.

Effect of *Sukupowder with AyakaanthaChendhooram*on Serum Bio-chemistry profile of rats in sub-acute toxicity study

Group I	**Blood sugar ® (mg/dl)**	**BUN (mg/dl)**	**Serum creatinine (mg/dl)**	**Serum total cholesterol (mg/dl)**	**Serum triglycerides level (mg/dl)**	**Serum HDL cholesterol (mg/dl)**	**Serum LDL cholesterol (mg/dl)**	**Serum VLDL cholesterol (mg/dl)**

Mean	67.17	14.33	0.4333	110.3	79.5	49.17	35.5	12.98
Std. Deviation	7.167	4.457	0.08165	22.6	16.26	7.96	17.42	3.277
Std. Error	2.926	1.82	0.03333	9.226	6.637	3.25	7.112	1.338
Group II	**Blood sugar ® (mg/dl)**	**BUN (mg/dl)**	**Serum creatinine (mg/dl)**	**Serum total cholesterol (mg/dl)**	**Serum triglycerides level (mg/dl)**	**Serum HDL cholesterol (mg/dl)**	**Serum LDL cholesterol (mg/dl)**	**Serum VLDL cholesterol (mg/dl)**
Mean	89.5	17.5	0.6333	111.7	73.17	58.33	32	13.6
Std. Deviation	13.94	4.231	0.3266	15.56	19.24	19.66	10.02	3.189
Std. Error	5.691	1.727	0.1333	6.354	7.855	8.028	4.091	1.302
Group III	**Blood sugar ® (mg/dl)**	**BUN (mg/dl)**	**Serum creatinine (mg/dl)**	**Serum total cholesterol (mg/dl)**	**Serum triglycerides level (mg/dl)**	**Serum HDL cholesterol (mg/dl)**	**Serum LDL cholesterol (mg/dl)**	**Serum VLDL cholesterol (mg/dl)**
Mean	80	20.83	0.6667	104.5	77.33	68	51.67	20.33
Std. Deviation	11.42	1.602	0.2582	12.13	12.96	7.43	4.633	2.503
Std. Error	4.662	0.654	0.1054	4.951	5.289	3.033	1.892	1.022

Values are mean ± S.D (n = 6 per group of which 3 males and 3 females). Control and treatment groups were compared statistically using one way ANOVA followed by Dunnett's test.

Effect of *Sukupowder with AyakaanthaChendhooram*on Serum Bio-chemistry profile of rats in sub-acute toxicity study

Group I	**Serum total protein (g/dl)**	**Serum albumin (g/dl)**	**(AST) (IU/ml)**	**(ALT) (IU/L)**	**(ALP) (IU/L)**
Mean	3.633	2.917	131.2	31.83	155.3
Std. Deviation	0.9668	0.5345	8.256	9.02	74.81
Std. Error	0.3947	0.2182	3.371	3.683	30.54

Group II	Serum total protein (g/dl)	Serum albumin (g/dl)	(AST) (IU/ml)	(ALT) (IU/L)	(ALP) (IU/L)
Mean	5.25	3.2	104.2	30.67	163.2
Std. Deviation	1.595	1.321	21.8	8.189	59.84
Std. Error	0.651	0.5391	8.901	3.343	24.43
Group III	**Serum total protein (g/dl)**	**Serum albumin (g/dl)**	**(AST) (IU/ml)**	**(ALT) (IU/L)**	**(ALP) (IU/L)**
Mean	4.717	3.683	109.2	31	132.2
Std. Deviation	1.528	0.6795	29.42	11.14	72.22
Std. Error	0.6237	0.2774	12.01	4.546	29.48

Values are mean ± S.D (n = 6 per group of which 3 males and 3 females). Control and treatment groups were compared statistically using one way ANOVA followed by Dunnett's test.

Quantitative data on absolute organ weight of rats treated with *Sukupowder with AyakaanthaChendhooram*for 28 days in Sub-acute toxicity study.

Group I	HEART (gms)	LIVER (gms)	KIDNEYS (gms)	SPLEEN (gms)	BRAIN (gms)	LUNG (gms)	STOMACH (gms)	TESTES (gms)	UTERUS & OVARY (gms)
Mean	0.54	4.672	1.283	0.55	1.383	1.317	1.233	2.7	1.333
Std. Deviation	0.1534	0.7039	0.1236	0.2588	0.2229	0.1941	0.2251	0.6083	0.1528
Std. Error	0.06261	0.2874	0.05044	0.1057	0.09098	0.07923	0.09189	0.3512	0.08819
Group II	**HEART (gms)**	**LIVER (gms)**	**KIDNEYS (gms)**	**SPLEEN (gms)**	**BRAIN (gms)**	**LUNG (gms)**	**STOMACH (gms)**	**TESTES (gms)**	**UTERUS & OVARY (gms)**
Mean	0.5633	6.213	1.268	0.5333	1.55	1.767	1.367	3.033	1
Std. Deviation	0.1515	1.122	0.1982	0.1751	0.2345	0.1506	0.3077	0.4041	0.3464
Std. Error	0.06184	0.4581	0.08093	0.07149	0.09574	0.06146	0.1256	0.2333	0.2

Group III	HEART (gms)	LIVER (gms)	KIDNEYS (gms)	SPLEEN (gms)	BRAIN (gms)	LUNG (gms)	STOMACH (gms)	TESTES (gms)	UTERUS & OVARY (gms)
Mean	0.715	6.928	1.635	0.65	1.633	1.55	1.333	3.667	0.7667
Std. Deviation	0.06745	0.9275	0.2407	0.2074	0.1211	0.3728	0.5125	0.9238	0.1528
Std. Error	0.02754	0.3786	0.09828	0.08466	0.04944	0.1522	0.2092	0.5333	0.08819

Values are mean ± S.D (n = 6 per group of which 3 males and 3 females) for Heart, Liver, Kidney, Brain, Spleen, Lung, Stomach. Values are mean ± S.D (n = 3 per group per sex) for testes , ovary and uterus for Control and treatment groups were compared statistically using one way ANOVA followed by Dunnett's test.

Histopathology Analysis (Male Rat) in Sub-acute toxicity Study

Low Power Magnification 10X

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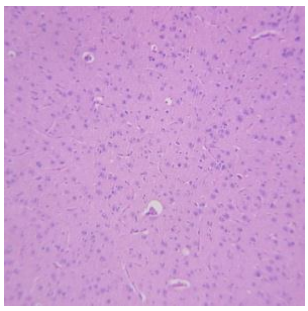
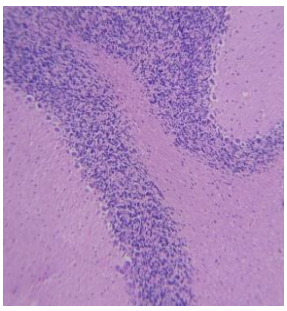
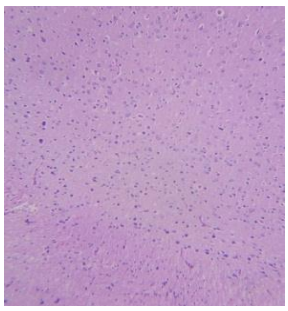
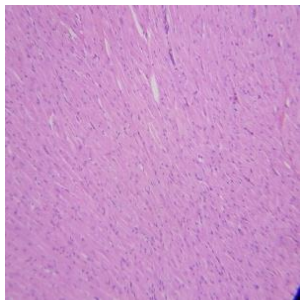
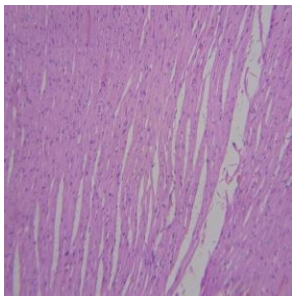
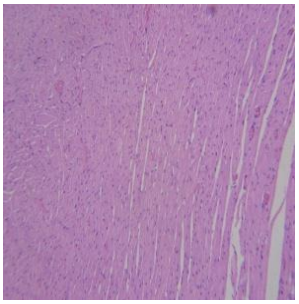
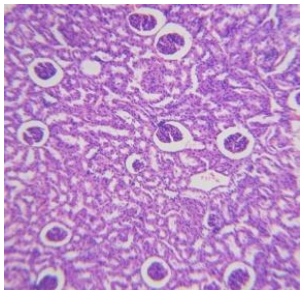
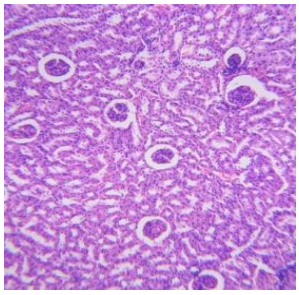
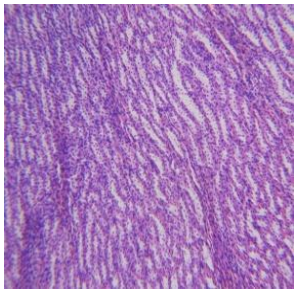
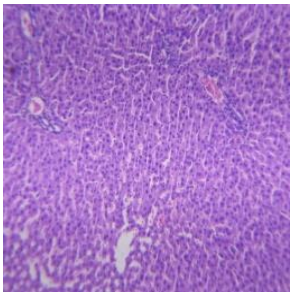
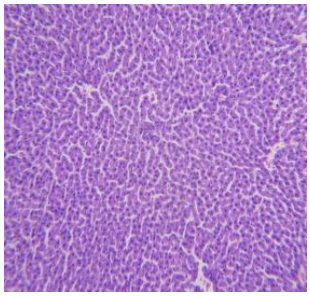
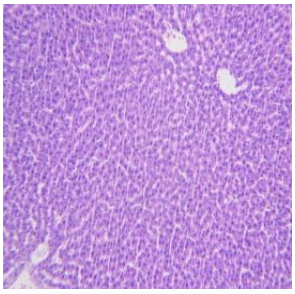
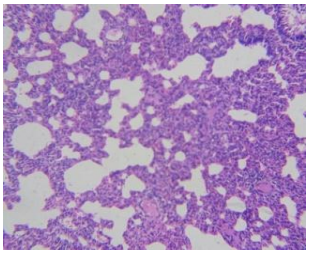
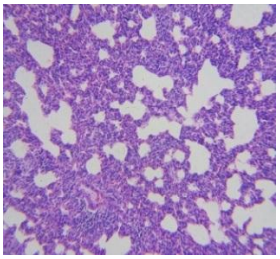
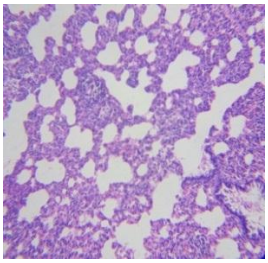
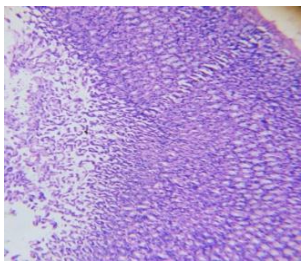
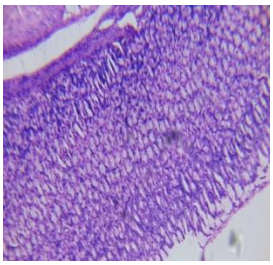
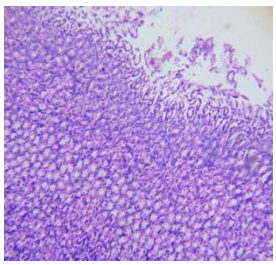
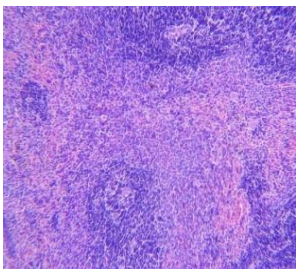
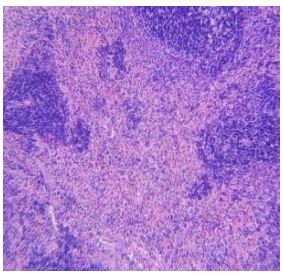
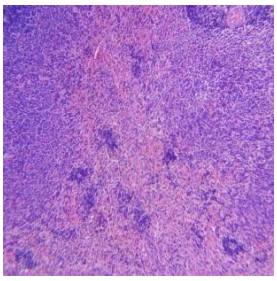
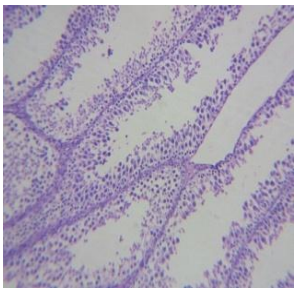
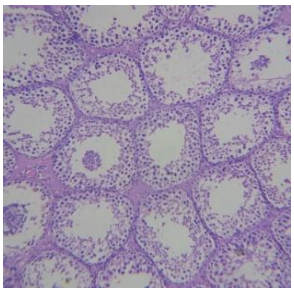
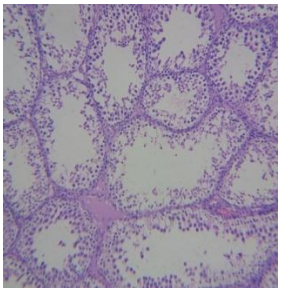
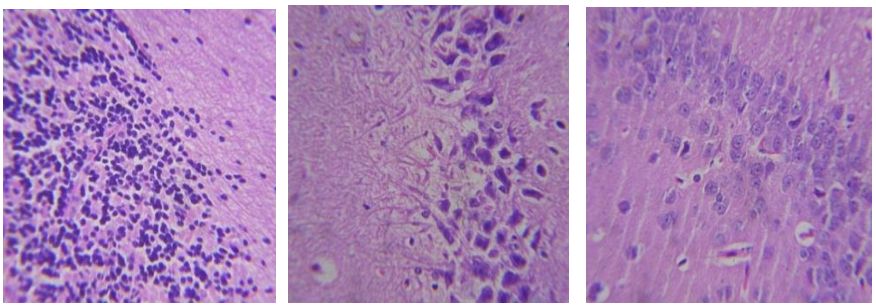
Brain			
Heart			
Kidney			
Liver			

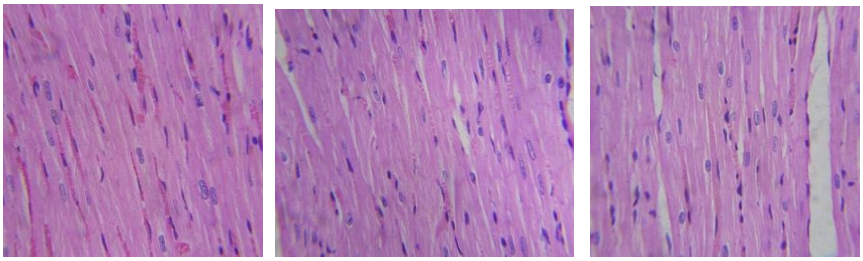
	GROUP I	GROUP II	GROUP III
Lung			
Stomach			
Spleen			
Testes			

High Power Magnification 40X

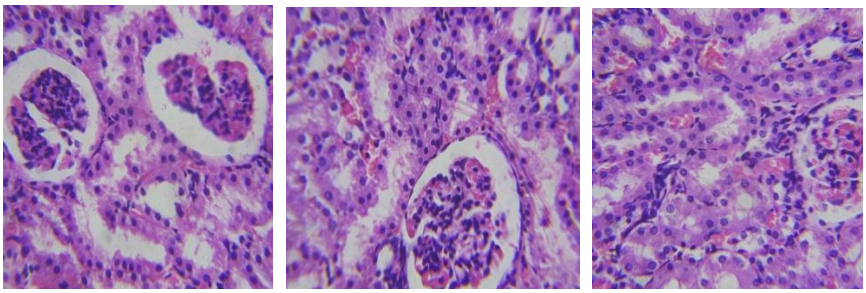
Brain



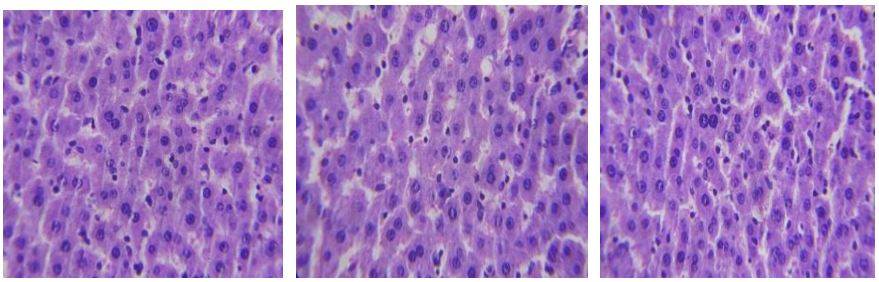
Heart



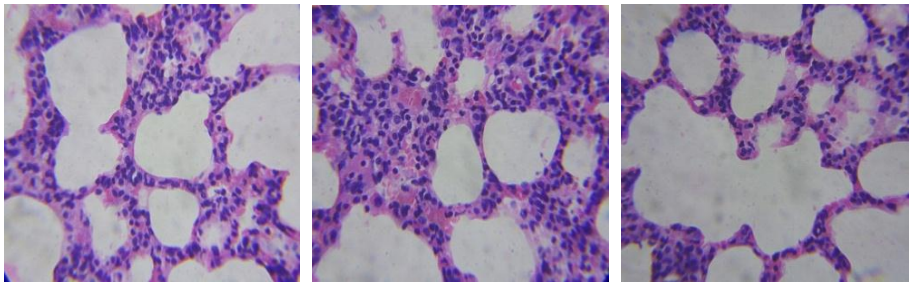
Liver



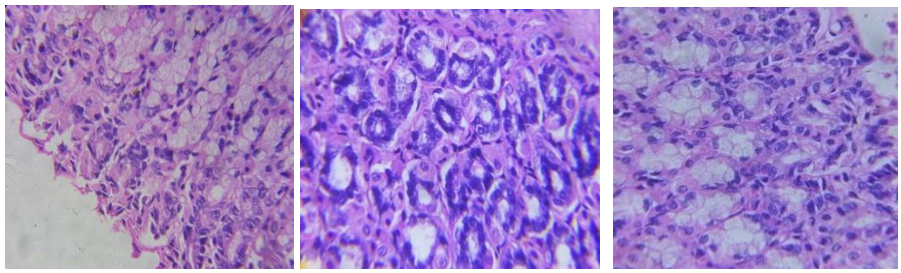
Kidney



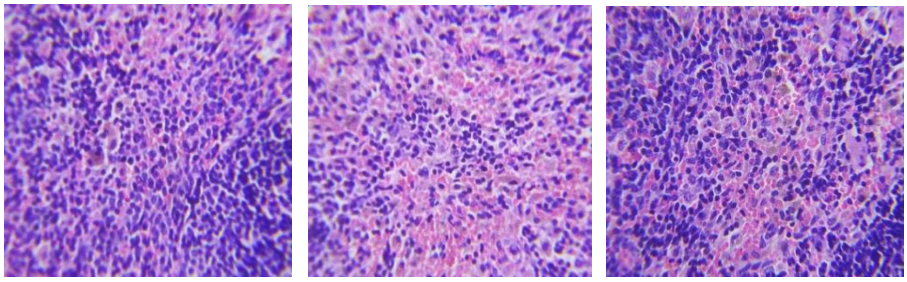
Lung



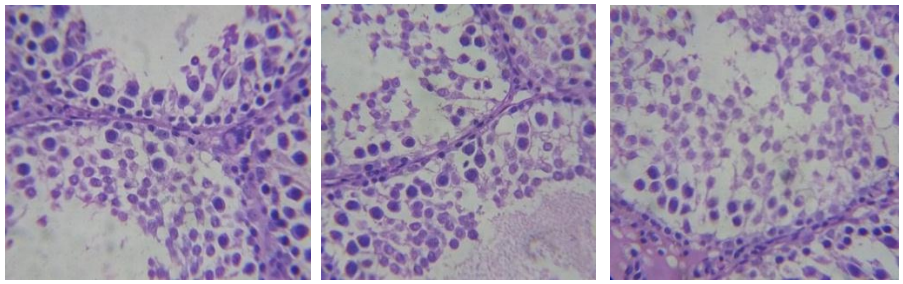
Stomach



Spleen

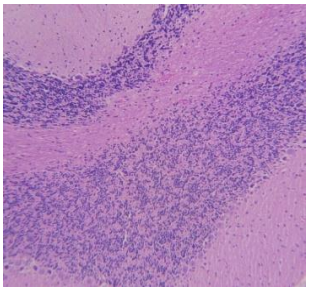
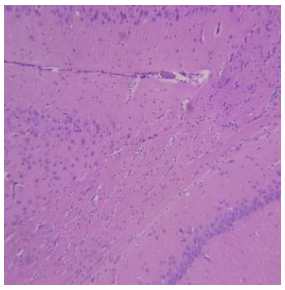
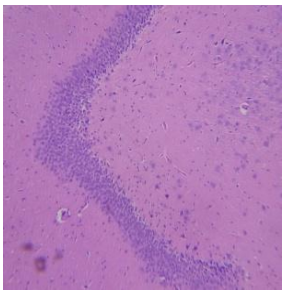
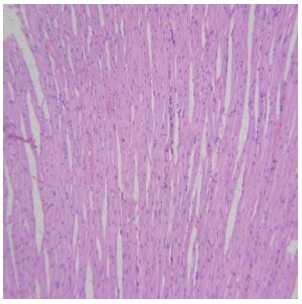
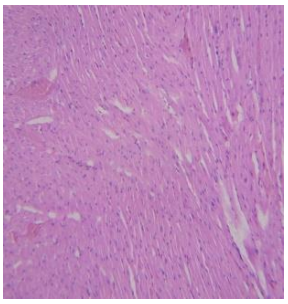
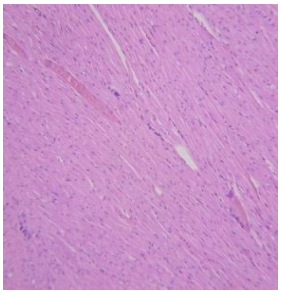
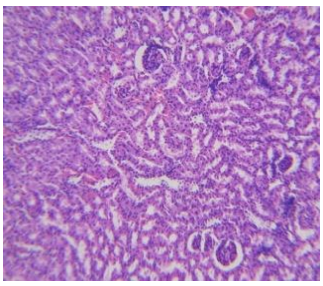
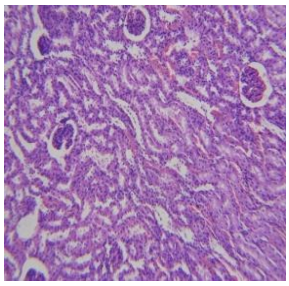
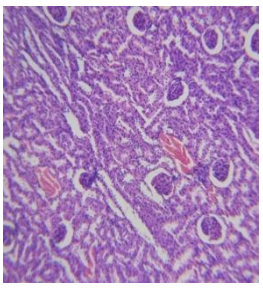
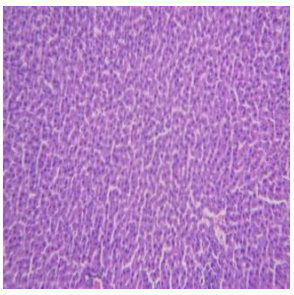
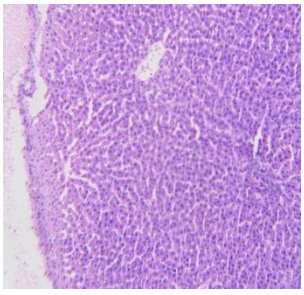
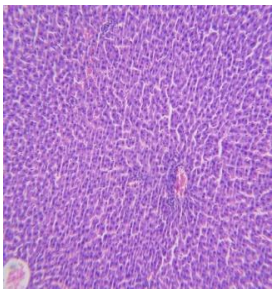


Testes

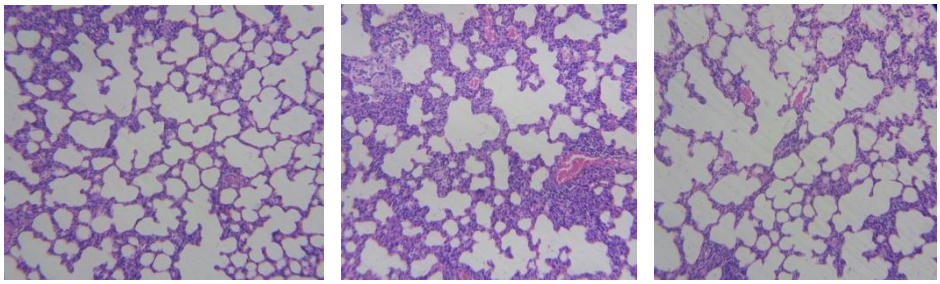


istopathology Analysis (Female Rat) in Sub-acute toxicity Study

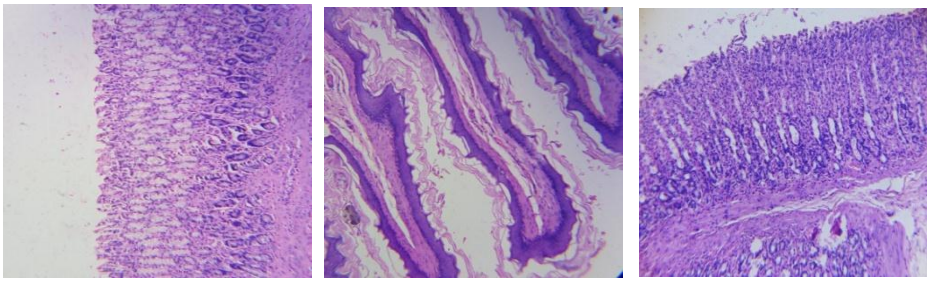
Low Power Magnification 10X

	GROUP I	GROUP II	GROUP III
Brain			
Heart			
Kidney			
Liver			

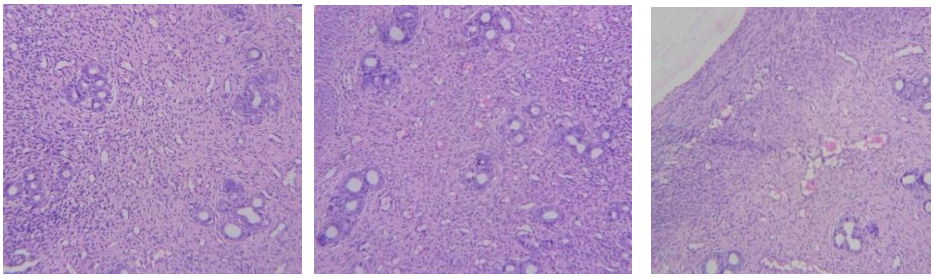
Lung



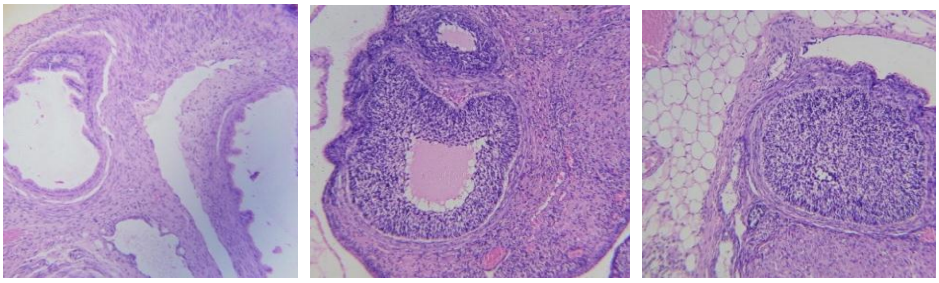
Stomach



Uterus

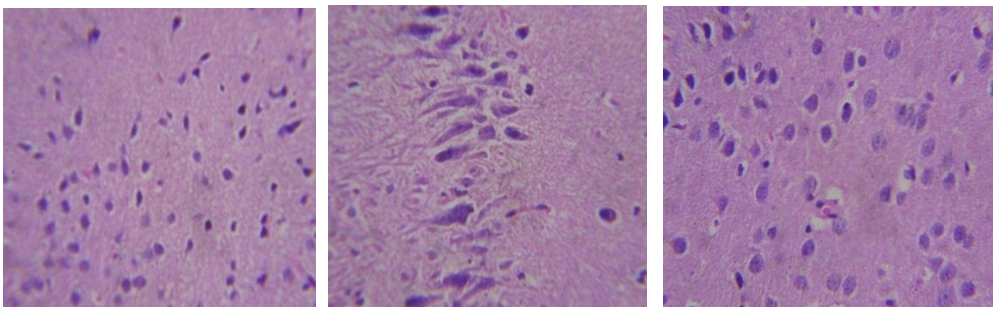


Ovary

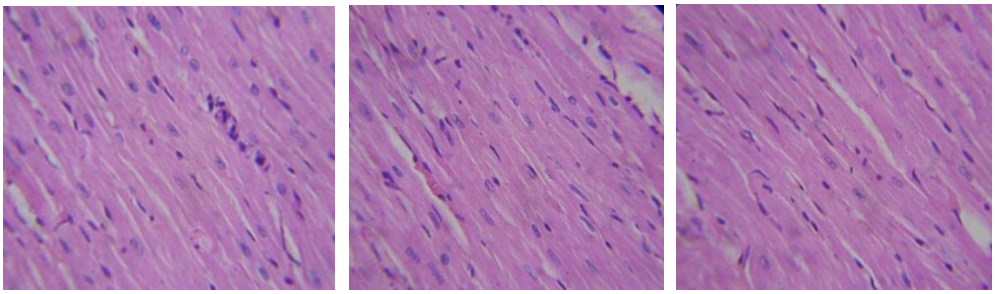


High Power Magnification 40X

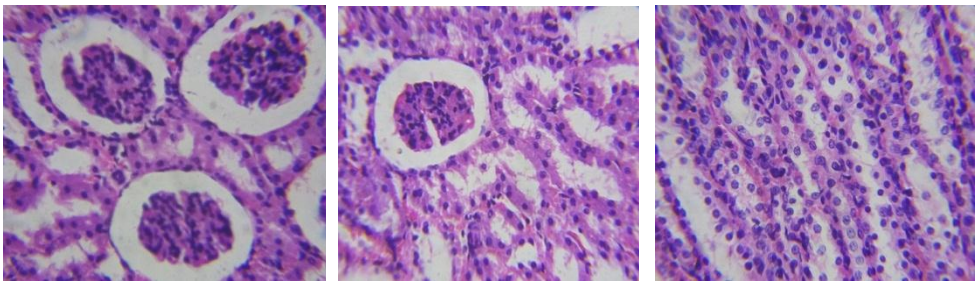
Brain



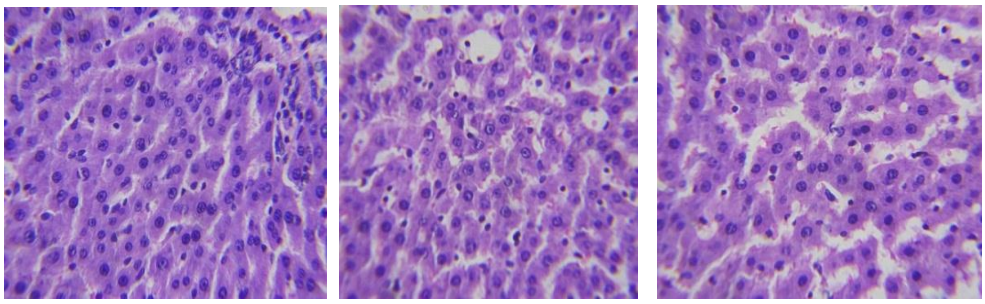
Heart



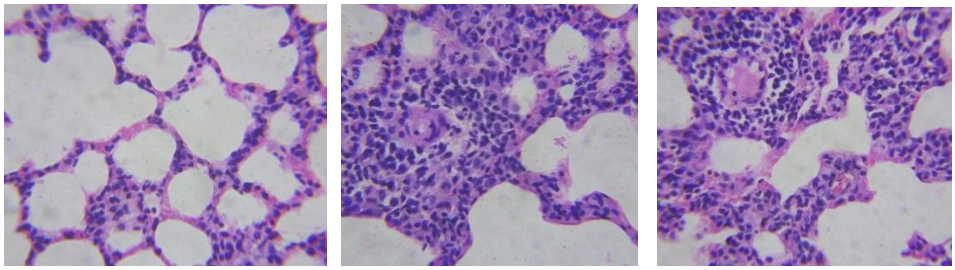
Kidney



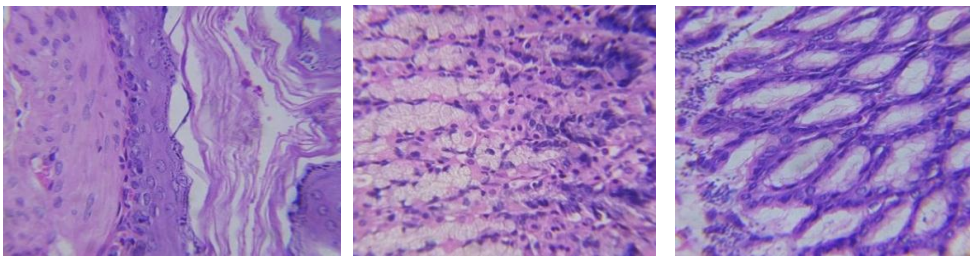
Liver



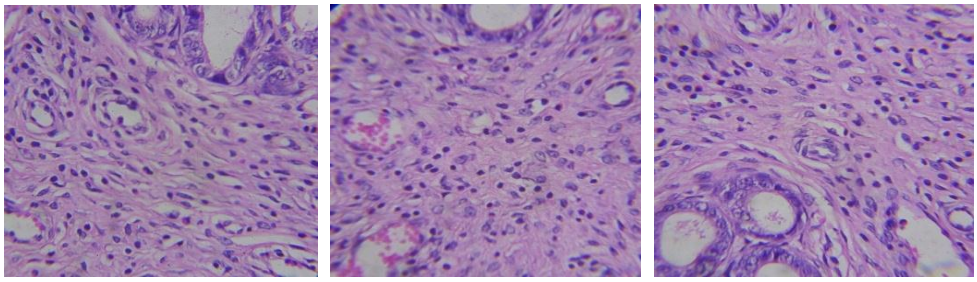
Lung



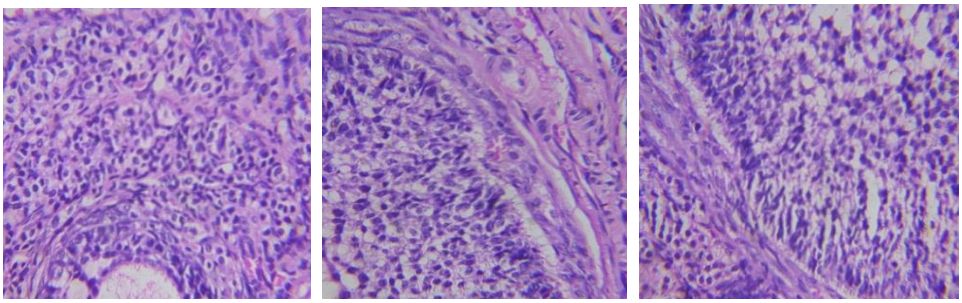
Stomach



Uterus



Ovary



CERTIFICATE

This is to certify that the project entitled "**PHARMACOLOGICAL EVALUATION OF AYAKAANTHA CHENDHOORAM ON CHRONIC CONSTRICTION INJURY INDUCED NEUROPATHIC PAIN IN WISTER RATS.**" has been approved by the Institutional Animal Ethics Committee of Sathyabama University, Chennai.

IAEC Approval No.: **SU/CLATR/IAEC/VII/047/2016**

Principal Investigator: Dr. K. R. Muthumari

Animal Sanctioned: *Rattus norvegicus* / Wistar Albino rats

Male: 24; Total: 24 (Twenty Four)

Date: 05.10.2016

B. Sheela Rani

DR. B. SHEELA RANI
Chairperson

DR. R. ILAVARASAN
CPCSEA Nominee

PHARMACOLOGICAL STUDY

Pharmacological Evaluation of *Ayakaantha chendhooram* on chronic constriction injury induced neuropathic pain in wistar rats

IAEC: SU/CLATR/IEAC/VII/047/2016

Animals:

Healthy adult Wistar albino male rats weighing between 230-250 g were used for the study. The animals were housed in poly propylene cages and were kept in well ventilated with 100% fresh air by air handling unit . A 12 light / dark cycle were maintained .Room temperature was maintained between 22 $\pm$ 2^{o} Cand relative humidity 50–65%. They were provided with food (Sai feeds, Bangalore, India) and water *ad libitum*. All the animals were acclimatized to the laboratory for 7 days prior to the start of the study.The experimental protocol was approved by The Institutional Animal Ethics Committee of Sathyabama University, Chennai, Tamil Nadu, India.

IAEC**:** SU/CLATR/IEAC/VII/047/2016

Experimental Methodology:

The animals were grouped into four groups of 6 animals each. Group I (Sham operated control group) –exposed to surgical procedure without nerve compression received normal saline 5ml/kg,p.o.Group II – Sciatic nerve compression induced group – in which animals are subjected to sciatic nerve compression by ligation method and serves as disease control. Animal belongs to group III (Low dose treatment group): Sciatic nerve compressed rats administered with 200mg/kg of *AyakaanthaChendhooram*, p.o for 21 days. Animal belongs to group IV (High dose treatment group): Sciatic nerve compressed rats administered with 200mg/kg of *AyakaanthaChendhooram*, p.o for 21 days.

Induction of peripheral neuropathy by chronic constriction injury (CCI):

Peripheral neuropathy was be induced in rats by chronic constriction injury method. The rats were anesthetized with thiopental sodium (35 mg/kg i.p.). The hair of the rat's lower back in thigh region of left paw was shaved, and sterilized with

povidone-iodine. The skin of the lateral surface of the left thigh was incised and a cut will made directly through the biceps femoris muscles to expose the sciatic nerve. Four ligatures (silk thread), placed around the nerve proximal part of the trifurcation with a distance of 1 mm between each ligature. After performing nerve ligation, muscular and skin layer was immediately sutured with thread and topical antibiotic was applied at once. Nociceptive threshold was assessed before and after performing surgery on different days i.e. 7, 14 and 21st day.

Heat Hyperalgesic test:

Heat hyperalgesia of the hind paw were assessed using Eddy's hot plate method, for assessing the reactivity to noxious and non-noxious thermal stimuli respectively. The rats was placed on the top of a controlled preheated (52.5 ± 0.5°C for hyperalgesia) and maintained hot plate surface, allowing access to the left hind paw withdrawal response to degree of the nociceptive threshold. The cut-off times of 45s for hyperalgesia were maintained.

Histopathological evaluation:

Samples of distal portion of sciatic nerve will be collected and the same is stored in the fixative solution (10% formalin) and cut into 10 μm thickness. Staining will be done by using hematoxylin and eosin. Nerve sections will be analyzed qualitatively under light microscope (450 X) for axonal degeneration.

Effect of *Ayakaanthachendhooram* on paw withdrawal response of chronic constriction injury induced rats

Group I	Before Treatment	After Treatment		
		7th Day	14th Day	21st Day
	Reaction time in Sec	Reaction time in Sec	Reaction time in Sec	Reaction time in Sec
	PW	PW	PW	PW
Mean	22	17.33	19.17	19.83
Std. Deviation	1.673	2.251	1.941	1.722
Std. Error	0.6831	0.9189	0.7923	0.7032

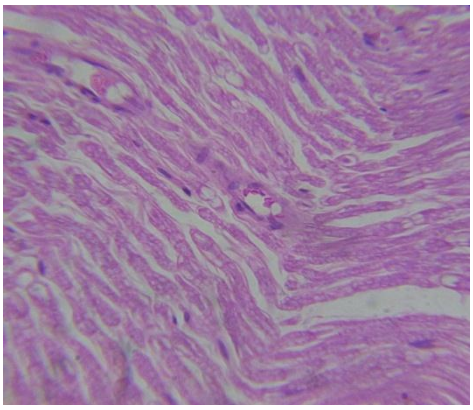
		After Treatment		
Group II	Before Treatment	7th Day	14th Day	21st Day
		Reaction time in Sec	Reaction time in Sec	Reaction time in Sec
	PW	PW	PW	PW
Mean	19.5	5.667	5.833	7.667
Std. Deviation	2.739	1.033	1.472	2.16
Std. Error	1.118	0.4216	0.6009	0.8819
		After Treatment		
Group III	Before Treatment	7th Day	14th Day	21st Day
		Reaction time in Sec	Reaction time in Sec	Reaction time in Sec
	PW	PW	PW	PW
Mean	17.83	7.667	10	11.5
Std. Deviation	3.061	1.033	1.414	1.871
Std. Error	1.249	0.4216	0.5774	0.7638
		After Treatment		
Group IV	Before Treatment	7th Day	14th Day	21st Day
		Reaction time in Sec	Reaction time in Sec	Reaction time in Sec
	PW	PW	PW	PW
Mean	19.33	9.833	12.67	15.17
Std. Deviation	1.966	1.169	2.066	1.169
Std. Error	0.8028	0.4773	0.8433	0.4773

- PW- Paw withdrawal
- Values are mean ± S.D / S.E (n = 6 per group)

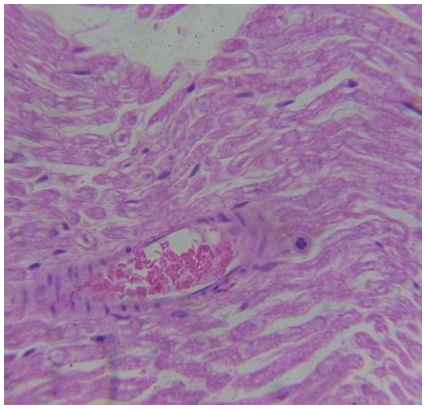
Histopathology of Rat Sciatic Nerve (H&E) Staining

High Power Magnification 40 X

Control Sham operated Group

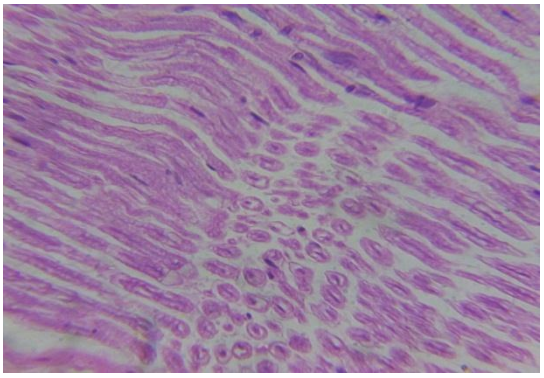


Sciatic Nerve Compressed group



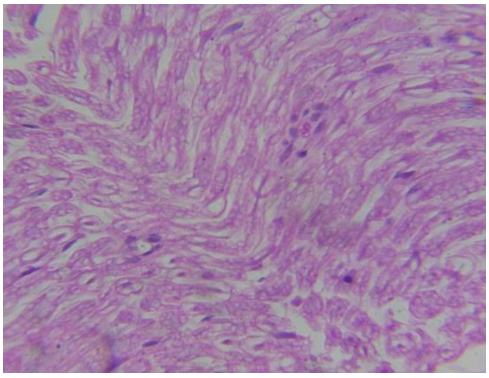
Sciatic Nerve Compression +

200 mg/kg of AKC



Sciatic Nerve Compression+

400 mg/kg of AKC



சித்த மருத்துவ மைய ஆராய்ச்சி நிலையம், சென்னை - 600 106
सिद्ध केंद्रीय अनुसन्धान संस्थान,
अण्णा सरकारी अस्पताल परिसर, अरुम्बाक्कम, चेन्नई – 600 106
SIDDHA CENTRAL RESEARCH INSTITUTE
(Central Council for Research in Siddha, Ministry of AYUSH, Govt. of India)
Anna Govt. Hospital Campus, Arumbakkam, Chennai – 600106
Phone: 044-2621 4925, Fax: 044-2621 4809

20.1.2017

CERTIFICATE

Name of the student: Dr. K. R. Muthumari, II year PG student, Pothu Maruthuvam, Government Siddha Medical College, Arumbakkam, Chennai-600 106.

Name of the sample: Aya Kaantha Chendhooram

Name of the Experiment	Value
Loss on drying(at 105°C)	0.165%
Total ash	99.48 %
Water soluble ash	2.22 %
Acid insoluble ash	11.46 %
pH value (10%)	3.7

(R. Shakila)
Research Officer (Chemistry) & Head,
Department of Chemistry

P. Elankani 21.01.17
(Dr. P. Elankani)
Research Officer (Scientist II) (Siddha)
for Assistant Director (Siddha) I/c

BIO-CHEMICAL ANALYSIS OF TRIAL MEDICINE

Preparation of Sodium Carbonate extract:

2 gm of the AYAKAANDHA CHENDHOORAM is mixed 5 gm of Sodium carbonate and taken in a 100 ml beaker and 20 ml of distilled water is added. The solution is boiled for 10 minutes, cooled and then filtered. The filtrate is called sodium carbonate extract.

S.No	EXPERIMENT	OBSERVATION	INFERENCE
I	**TEST FOR ACID RADICALS**		
1a	**Test for Sulphate** 2 ml of the above prepared extract is taken in a test tube. To this add 2ml of 4% Ammonium oxalate solution.	Absence of White Precipitate	Absent
B	2ml of extract is added with 2ml of dilute hydrochloric acid until the effervescence ceases off. Then 2ml barium chloride solution is added.	Absence of White Precipitate	Absent
2	**Test for Chloride:** 2ml of extract is added with dilute nitric acid till the effervescence ceases. Then 2ml of silver nitrate solution is added.	white precipitate obtained	Present
3	**Test for Phosphate** 2ml of the extract is treated with 2 ml of Ammonium molybdate solution and 2ml of concentrated nitric acid.	Yellow precipitate obtained	Present
4	**Test for Carbonate:** 2ml of the extract is treated with 2ml of magnesium sulphate solution.	Absence of white precipitate	Absent
5	**Test for Sulphide:** 1 gm of the substance is treated with 2ml of concentrated Hcl.	Absence of Rotten egg smelling	Absent
6	**Test for Nitrate:** 1gm of the substance is heated with copper turnings and concentrated sulphuric acid and viewed the test tube vertically down.	Absence of reddish brown gas.	Absent

7a	**Test for Fluoride and oxalate** 2ml of the extract is added with 2ml of dilute acetic acid and 2ml of calcium chloride solution and heated.	Absence of white precipitate	Absent
B	5 drops of clear solution is added with 2ml of diluted sulphuric acid and slightly warmed to this, 1 ml of dilute potassium permanganate solution is added.	KMNO4 solution Discolourisation obtained	Present
8	**Test for Nitrite** 3 drops of the extract is placed on a filter paper. On that, 2 drops of Acetic Acid and 2 drops of Benzidine solution is placed.	Absence of yellowish red colour	Absent
9	**Test for Borate** 2 pinches of the substance is made into paste by using Sulphuric acid and Alcohol (95%) and introduced into the blue flame.	Absence of Green tinged flame	Absent
II	**TEST FOR BASIC RADICALS**		
10	**Test for lead** 2 ml of the extract is added with 2 ml of Potassium iodide solution.	Absence of Yellow precipitate	Absent
11a	**Test for Copper** One pinch of substance is made into paste with concentrated Hydrochloric acid in a watch glass and introduced into the non luminous part of the flame.	Absence of Bluish green coloured flame.	Absent
B	2ml of the extract is added with excess of Ammonia solution	Absence of deep blue	Absent
12	**Test for Aluminium** To the 2 ml of extract. Sodium Hydroxide solution is added in drops to excess	Absence of White Precipitate.	Absent
13a	**Test for Iron** To the 2 ml of extract, 2 ml of Ammonium Thiocyanate Solution is added.	Absence of Blood red colour	Absent
B	To the 2 ml of extract, 2 ml of Ammonium Thiocyanate solution and 2 ml of concentrated Nitric Acid	Blood red colour obtained	Present

	is added.		
14	**Test for Zinc** To the 2 ml of extract Sodium Hydroxide solution is added in drops to excess.	Absence of White precipitate.	Absent
15	**Test for Calcium** 2 ml of the extract is added with 2 ml of 4% Ammonium Oxalate solution.	Absence of White precipitate.	Absent
16	**Test for Magnesium** 2ml of extract, Sodium Hydroxide solution is added in drops to excess.	Absence of White precipitate.	Absent
17	**Test for Ammonium** 2 ml of extract few ml of Nessler's Reagent and excess of Sodium Hydroxide solution are added.	Absence of Reddish brown precipitate	Absent
18	**Test for Potassium** A pinch of substance is treated with 2 ml of Sodium Nitrite solution and then treated with 2 ml of Cobal Nitrate in 30% glacial Acetic acid.	Absence of Yellow precipitate	Absent
19	**Test for Sodium** 2 pinches of the substance is made into paste by using Hydrochloric acid and introduced into the blue flame.	Absence of Yellow colour flame	Absent
20	**Test for Mercury** 2 ml of the extract is treated with 2 ml of Sodium Hydroxide solution.	Absence of yellow precipitate	Absent
21	**Test for Arsenic** 2 ml of extract is treated with 2 ml of silver Nitrate solution.	Absence of Yellow precipitate	Absent
22	**Test for Starch** 2ml of extract is treated with weak iodine solution	Absence of Blue colour	Absent
23	**Test of reducing Sugar** 5ml of Benedicts qualitative solution is taken in a test tube and allowed to boil for 2 minutes and added 10 drops of the extract and again boiled for 2 minutes. The colour changes are noted.	Absence of Green colour	Absent

24	**Test of the alkaloids** 2ml of the extract is treated with 2ml of potassium lodide solution.	Presence of Red colour	Present
25	**Test of the proteins** 2ml of the extract is treated with 2ml of 5% NaOH, mix well and add 2 drops of copper sulphate solution.	Absence of Violet colour	Absent

RESULTS:

The given sample **Ayakaandha chendhooram** contains

Acid Radicals : Chloride, Phosphate, Flouride and Oxalate.

Basic Radicals : Iron, Calcium.

Miscellaneous : Alkaloid.

GOVERNMENT SIDDHA MEDICAL COLLEGE
Arumbakkam, Chennai-106

Communication Of The Decision Of Institutional Ethics Committee (IEC)

IEC No: GSMC-CH-ME-4/2015/008

Protocol title:
A CLINICALSTUDY ON VATHASTHAMBAM WITH THE EVALUATION OF SIDDHA DRUG AYA KAANTHA CHENDHOORAM

Principal Investigator: DR.K R. MUTHUMARI

Name & Address of Institution :

Government siddha medical college,

Arumbakkam, Chennai-106

☑ New Review ☐ Revised Review ☐ Expedited Review

Date of review (DD/MM/YY): 26-03-2015

Date Of Previous Review, If Revised Application :

Decision of the IEC

☑ Recommended ☐ Recommended with suggestions

☐ Revision ☐ Rejected

Suggestions / Reasons / Remarks :

Recommended for a period of 1 year
from date of completion of preclinical studies:

Please Note:

- Inform IEC immediately in case of any adverse events/serious drug reaction.
- Seek IEC approval in case of any change in the study procedure, site and investigator
- This approval is valid only for period mentioned above
- IEC member have the right to review the trial with prior intimation.

Dr.P.Jeyaprakashnarayanan
Chairman

Dr.V. Banumathi
Member Secretary

INSTITUTIONAL ETHICS COMMITTEE

Date:

Sub: IEC review of research proposals.

Ref: Your letter dated

MEMBERS	PARTICIPATION	SIGNATURE
DR.P.JEYAPRAKASH NARAYANAN M.D(S)., Chairman		
DR.V.BANUMATHI M.D(S)., Member Secretary		26/03/15
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DR.P.SATHIYA RAJESWARAN M.D(S)., Clinician- Siddha	✓	26/3/15
DR.G.AADINAAATH REDDY,M.Pharm, Ph.D., Pharmacologist	✓	Aadinaath 26/03/15
DR.S.THILAGAVATHY Msc.,Ph.D., Social Scientist	✓	26/3/15
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MR.P.SARAVANAN., Public Person	✓	

Dr.P.Jeyaprakashnarayanan
Chairman

Dr.V.Banumathi
Member Secretary

BIOSTATISTICAL ANALYSIS

Treatment for Vathasthambam:

The most popular statistical tool, namely, McNemar Test analysis has been employed to analyses the effectiveness with the help of a hypothesis.

S. No	Clinical Manifestation	Before Treatment	After Treatment
		n%	n%
1.	Low back pain	20(100)	5(25)**
2.	Tingling pain / Numbness	18(90)	0(0)**
3.	Difficulty moving the leg / foot	12(60)	3(15)**
4.	Radiating pain to back and lower limb	20(100)	4(20)**
5.	Tenderness	8(40)	0(0)**
6.	Burning sensation	14(70)	2(10)**
7.	Constipation	8(40)	2(10)**
8.	Loss of appetite	11(55)	0(0)**

McNemar test, C.I: 95%, *P<0.05; **P<0.01

Software: spss17 version

Number of cases: 20

Inference:

Since the p value is significant in all clinical manifestations. So there is significant reducing of clinical manifestations among the patients for the treatment of Vathasthambam. Hence it is concluded that the treatment was effective and **significant.**

Treatment for Vathasthambam:

The most popular statistical tool, namely, McNemar Test analysis has been employed to analyses the effectiveness with the help of a hypothesis.

S. No	Name of the Grade	Before Treatment	After Treatment
		n%	n%
1.	No pain Grade I	0(0)	15(75)**
2.	Mild pain Grade II	2(10)	1(5)*
3.	Moderate pain Grade III	14(70)	3(15)**
4.	Severe pain Grade IV	4(20)	1(5)*

McNemat test, C.I: 95%, *P<0.05; **P<0.01

Software: spss17 version

Number of cases: 20

Inference:

Since the p value is significant in all sides. So there is significant changes grades of pain among the patients for the treatment of Vathasthambam. Hence it is concluded that the treatment was **effective** and **significant.**

GOVERNMENT SIDDHA MEDICAL COLLEGE

ARINGAR ANNA GOVERNMENT HOSPITAL OF INDIAN MEDICINE

CHENNAI-106

CLINICAL STUDY ON "AYAKAANTHA CHENDHOORAM"

IN THE TREATMENT OF "VATHASTHAMBAM (SCIATICA)"

INFORMED CONSENT FORM

"I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction.

I consent voluntarily to participate as a participant in this study and understand that I have the right to withdraw from the study at any time without in any way it affecting my further medical care".

"I have received a copy of the information sheet / consent form".

Date:

Signature of participant:

In case of illiterate participant

"I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely."

Date:

Station:

Signature of participant:

Signature of Guide: Signature of the Investigator

அரசு சித்த மருத்துவ கல்லூரி, சென்னை – 106

அறிஞர் அண்ணா மருத்துவமனை, சென்னை.

வாதஸ்தம்பம் நோய்க்கான சித்தமருந்தின் அயகாந்த செந்தூரம்.

பரிகரிப்புத் திறனைக் கண்டறியும் மருத்துவ ஆய்விற்கான தகவல் படிவம்

ஒப்புதல் படிவம்.

ஆய்வாளரால் சான்றளிக்கப்பட்டது

நான் இந்த ஆய்வு குறித்த அனைத்து விவரங்களையும் நோயாளிக்கு புரியும் வகையில் எடுத்துரைத்தேன் என உறிதியளிக்கிறேன்.

தேதி: கையொப்பம்:

இடம்: பெயர்:

நோயாளியின் ஒப்புதல்

என்னிடம் இந்த மருத்துவ ஆய்வின் காரணத்தையும், மருந்தின் தன்மை மற்றும் மருத்துவ வழிமுறை பற்றியும், தொடர்ந்து என் உடல் இயக்கத்தை கண்காணிக்கவும், அதனை பாதுகாக்கவும், பயன்படும் மருத்துவ ஆய்வுக்கூட பரிசோதனைகள் பற்றி திருப்தி அளிக்கும் வகையில் ஆய்வு மருத்துவரால் விளக்கிக் கூறப்பட்டது.

நான் இந்த மருத்துவ ஆய்வின் போது காரணம் எதுவும் கூறாமல், எப்பொழுது வேண்டுமானலும் இந்த ஆய்விலிருந்து என்னை விடுவித்துக் கொள்ளும் உரிமையை தெரிந்திருக்கின்றேன். நான் என்னுடைய சுதந்திரமாக தேர்வு செய்யும் உரிமையைக் கொண்டு வாதஸ்தம்பம் நோய்க்காண அயகாந்த செந்தூரம் மருந்தின் பரிகரிப்புத் திறனைக் கண்டறியும் மருத்துவ ஆய்விற்கு என்னை உட்படுத்த ஒப்புதல் அளிக்கிறேன்.

தேதி: கையொப்பம்:

இடம்: பெயர்:

தேதி: சாட்சிக்காரர் கையொப்பம்:

இடம்: பெயர்:

உறவுமுறை:

துறைத்தலைவர் கையொப்பம்: ஆராய்ச்சியாளர் கையொப்பம்:

CASE SHEET PROFORMA FOR VATHASTHAMBAM

GOVT.SIDDHA MEDICAL COLLEGE & HOSPITAL

CHENNAI-106

POST GRADUATE DEPARTMENT BRANCH –I MARUTHUVAM

Duration: 2015-2017

Op No / Ip No	:	Occupation	:
Ward No	:	Income	:
Bed No	:	Nationality	:
Name	:	Religion	:
Age	:	D.O.A	:
Sex	:	D.O.D	:
Address	:	Diagnosis	:

1. Complaints and duration :

2. History of present illness :

3. History of past illness :

4. Personal history :

5. Occupational history :

6. Menstrual history :

7. Personal Habits :Veg/nonveg/smoker/Alcoholic/Tobacco chewer

8. Family History :

General examination:

Patient consciousness :

Body Built :

Nourishment :

Pallor :

Jaundice :

Cyanosis :

Clubbing :

JVP :

Tracheal deviation :

Pedal oedema :

Lymph adenopathy :

Vital Signs:

Body Temp :

Pulse :

Respiratory rate :

Blood Pressure :

Weight :

Siddha aspect:

Nilam:

Kurinchi :

Mullai :

Marutham :

Neithal :

Palai :

PARUVA KALAM

Kaar :

Koothir :

Munpani :

Pinpani :

Elavenil :

Muduvenil :

YAAKKAI (Udal)

Vaatham :

Pittham :

Kabam :

Kalappu :

GUNAM

Satthuvam :

Rajotham :

Thamasam :

PORI/PULANGAL (SENSORY ORGANS)

Mei –Sensation :

Vaai – Taste :

Kan – Vision :

Mooku - Smell :

Sevi – Hearing :

KANMENTHRIYAM/KANNMA VIDAYAM [MOTOR ORGANS]

Kai- Dhaanam :

Kaal-Kamanam :

Vaai-Vasanam :

Eruvaai- Visarkkam :

Karuvaai-Aanantham :

UTHKAAYA ATHAKAAYAM

Puyam[forearm] :

Sayam[arm] :

Kaal[leg] :

Paaatham[feet] :

UYIR THATHUKKAL

A.VATHAM

Piranan :

Abanan :

Viyanan :

Udanan :

Samanan :

Nagan :

Koorman :

Kirukaran :

Devathathan :

Thananjeyan :

B.PITHAM

Anar pitham :

Ranjaga pitham :

Saathaga pitham :

Pirrasaga pitham :

Alosaga pitham :

C.KABAM

Avalambagam :

Kilethagam :

Pothagam :

Tharpagam :

Santhigam :

UDALTHAATHUKKAL

Saaram :

Senner :

Oon :

Kozhuppu :

Enbu :

Moolai :

Sukkilam/Suronitham :

ENVAGAI THERVUGAL

1.Naa :

2.Niram :

3.Mozhi :

4.Vizhi :

5.Sparisam :

6.Malam :

7.Moothiram

a)Neer Kuri :

b)Nei Kuri :

8.Naadi :

MALAM

Niram :

Edai :

Erugal :

Elagal :

MOOTHIRAM

1.Neerkuri

Niram :

Manam :

Edai :

Nurai :

Enjal :

2.Neikuri

Clinical signs and symptoms of vathasthambam

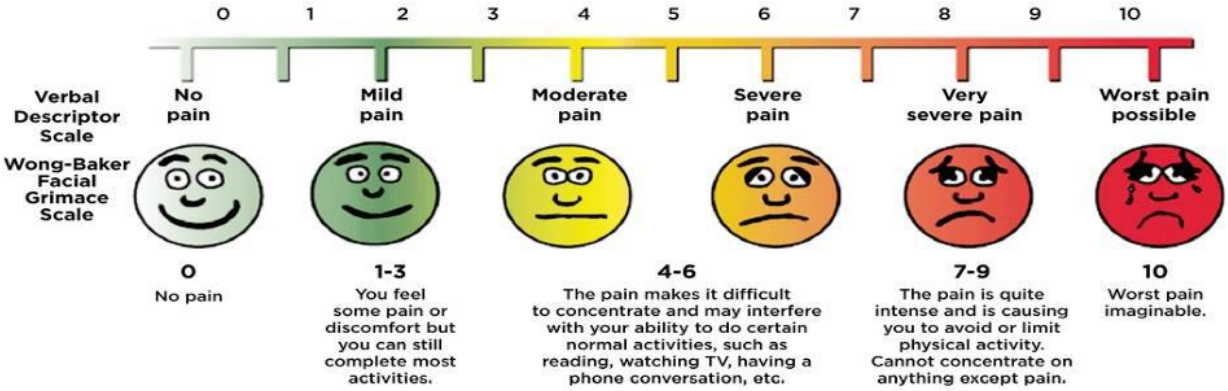
Symptoms	Before Treatment	After Treatment						
		7th day	14th day	21st day	28th day	35th day	42nd day	49th day
Low back pain								
Burning sensation down the leg								
Tingling pain / Numbness								
Radiating pain to back to lower limb								
Tenderness								
Difficulty to moving the leg								
Loss of appetite								
Constipation								

Specific test and signs :

	POSITIVE	NEGATIVE
1. SLR test		
2. Lasegue's sign		
3. Schober's test		
4. Flip test		

Universal pain assessment scale:

1. Universal Pain Assessment Scale:



Grade 0 : No pain

Grade 1- 3 : Mild pain

Grade 4- 6 : Moderate pain

Grade 7- 10 : Severe pain

INVESTIGATION:

1. Blood

TC
DC
ESR
Hb
Blood sugar
Blood urea
Serum cholesterol

2. Urine

Albumin
Sugar
Deposit

3. Specific investication

X-ray of lumbo sacral spine AP and Lateral view .

MRI whole spine.

Case summary:

Diagnosis: VATHASTHAMBAM (SCIATICA).

TRIAL DRUG:

AYAKAANTHA CHENDHOORAM

Dose : 130 mg bd

Anubanam : Chukku powder

Duration of Treatment : 48days

Medical Officer Signature: **HOD**

DATE	DAILY REPORT	MEDICINE

ADVICE:

MEDICAL OFFICER:

H.O.D/Guide

BIBLIOGRAPHY

1.Theivapuzhavar Thiruvallur,Thirukkural,V.O.Chidhambarapillai urai,First Edition,2013,V.O.C Noolagam,Kural no 944 pg.346.

2.Manish kumar,et.al.Epidemology,pathophysiology and symptomatic treatment of sciatica,Institute of Biomedical Edication & Research,2011;2(4);1050-1061.

3.Norman s. Williams, P.Ronan o'connell, Bailey & Love's Short Practice of Surgery,26th Edition,2013,pg- 468

4.K.S.Murugesan, Theraiyar Maruthuva Baratham ,Vijaya Vikadan Publisher,First Edition,1909,pg-8.

5.S.B.Ramachandran ,Yugi mamunivar Vaidhya Chinthamani,Thamarai Noolagam,First Edition 1998,pg.92.

6.S.B.Ramachandran ,Yugi mamunivar Vaidhya Chinthamani,Thamarai Noolagam,First Edition 1998,pg.92.

7.Dr.M.Shanmugavelu,H.B.I.M, Noi Nadal Noi Mudal Nadal Thirattu,Part -1,Indian Medicine and Homeopathy,Fourth Edition 2006,pg-266.

8.I.Ponnai,Pararasasekaran,Thirugnana ambantharAchiyanthirasaalai, Mallakam, 1934, pg-59.

9.I.Ponnai,Pararasasekaran,ThirugnanaSambantharAchiyanthirasaalai,Mallakam,193, pg-60.

10..I.Ponnai,Pararasasekaran,ThirugnanaSambantharAchiyanthirasaalai,Mallakam,19 34,pg-61

11.NDr.R.Thiyagarajan,L.I.M,Agasthiyar Kanmakaandam 300,Arulmigu Pazhani Thandayuthapani Swami Thirukoil,First Edition,1976,pg-13.

12.Agathiyar Gunavagadam,Mazhaiyappasami Vaithiya Salai Publishers,Pazhani,pg-34.

13.Theriyar vagadam ,Pazhani thandayuthapani swami thirukoil,199976,pg-72.

14.Theriyar vagadam ,Pazhani thandayuthapani swami thirukoil,199976,pg-72.

15.Theriyar vagadam ,Pazhani thandayuthapani swami thirukoil,199976,pg-37.

16.Dr.T.Balasubramanian,ThirumanthiramVilakavurai,part-3,Gangaiputhaga Nilayam,first edition,April 2012,pg-724.

17. Kalathoor Kandhasamy Mudhaliyar, Pathinen siddhargalin Naadi saasthiram, B.Rathinanayakkar and Sons, First Edition, 1969, Pg.87.

18.K.N.Kuppusamy mudaliyar,BSMS, Siddha Maruthuvasm,Indian Medicine and Homeopathy,2012,pg-578.

19.T.V.Sambasivam pillai ,Tamil-English Dictionary,Volume 4,Department of Indian Medicine and Homeopathy,Second Edition 1997,pg-278

20.Dr.M.Shanmugavelu,H.B.I.M, Noi Nadal Noi Mudal Nadal Thirattu,Part -1,Indian Medicine and Homeopathy,Fourth Edition 2006,pg-233

21Dr.M.Shanmugavelu,H.B.I.M, Noi Nadal Noi Mudal Nadal Thirattu,Part -1,Indian Medicine and Homeopathy,Fourth Edition 2006,pg-109.

22.Dr.M.Shanmugavelu,H.B.I.M, Noi Nadal Noi Mudal Nadal Thirattu,Part -1,Indian Medicine and Homeopathy,Fourth Edition 2006,pg-234.

23. Kannusami Pillai, Kannusamiyam Ennum Vaithiya Sekaram, B.Rathina Nayakar and sons, 1965, Pg.21.

24. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg. 172.

25. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg. 175.

26. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg.234.

27. Dr.K.S.Uthamarayan, Siddha Maruthuvaanga Surukkam, Indian Medicine and Homeopathy, third Edition 2006, Pg. 509.

28. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg. 265.

29. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg.266.

30. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg. 266.
31. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg. 243.
32. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg. 244.
33. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg.72
34. Kannusami Pillai, Kannusamiyam Ennum Vaithiya Sekaram, B.Rathina Nayakar and sons, 1965, Pg.21.
35. Kannusami Pillai, Kannusamiyam Ennum Vaithiya Sekaram, B.Rathina Nayakar and sons, 1965, Pg.22.
36. Dr.K.S.Uthamarayan, Siddha Maruthuvaanga Surukkam, Indian Medicine and Homeopathy, third Edition 2006, Pg. 142.
37. M. Dr Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg.74.
38. M. Dr Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg.74.
39. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg.239.
40. Dr. M. Shanmugavelu, H.B.I.M, Noi Nadal Noi Mudhal Nadal Thirattu, Part I, Indian Medicine and Homeopathy, Fourth Edition 2006, Pg.255.
41.Theivapuzhavar Thiruvalluvar, Thirukkural, V.O.Chidhambarapillai urai, First Edition, 2013, V.O.C.Noolagam, Marunthu Athikaram, Kural no 942 Pg.348.
42. Theivapuzhavar Thiruvalluvar, Thirukkural, V.O.Chidhambarapillai urai, First Edition, 2013, V.O.C.Noolagam, Marunthu Athikaram, Kural no 943 Pg.348.
43. Theivapuzhavar Thiruvalluvar, Thirukkural, V.O.Chidhambarapillai urai, First Edition, 2013, V.O.C.Noolagam, Marunthu Athikaram, Kural no 944 Pg.348.
44. Theivapuzhavar Thiruvalluvar, Thirukkural, V.O.Chidhambarapillai urai, First Edition, 2013, V.O.C.Noolagam, Marunthu Athikaram, Kural no 945 Pg.348.
45. Theivapuzhavar Thiruvalluvar, Thirukkural, V.O.Chidhambarapillai urai, First Edition, 2013, V.O.C.Noolagam, Marunthu Athikaram, Kural no 946 Pg.348.
46. Theivapuzhavar Thiruvalluvar, Thirukkural, V.O.Chidhambarapillai urai, First Edition, 2013, V.O.C.Noolagam, Marunthu Athikaram, Kural no 947 Pg.348.

47. Theivapuzhavar Thiruvalluvar, Thirukkural, V.O.Chidhambarapillai urai, First Edition, 2013, V.O.C.Noolagam, Marunthu Athikaram, Kural no 950 Pg.348.

48. Dr.R.Thiyagarajan, Theraiyar Venba, Anbu selvi Publisher, 1974, Pg.150.

49. Dr.R.Thiyagarajan, Theraiyar Venba, Anbu selvi Publisher, 1974, Pg.159.

50.K.Anbalagan,Theraiyar yamaga venba ,part I,Thiruvalargal printers,2003,pg no-134

51. .K.Anbalagan,Theraiyar yamaga venba ,part I,Thiruvalargal printers,2003,pg no-134

52.S.P.Ramachandran, Padartha Guna Chinthamani, Tamarai Noolagam, Second Edition, 1996,Pg.369.

53.SP.Ramachandran, Padartha Guna Chinthamani, Tamarai Noolagam, Second Edition, 1996,Pg.213.

54.Stephen L.Hauser, M.D,ph.D,.Harrison's Neurology in Clinical Medicine, Second Edition,China Translation &Printing Service Ltd,2010, pg no-531.

55.Gerard J. Tortora, Principle of Anatomy and Physiology ,13th Edition .,John Wiky & Sons ltd,2012,pg no-510-11.

56.T.S.Ranganathan,Text book of Human Anatomy,5th Edition, S.Chand & company ltd, 2013,pg no-162.

57.B.D Chaursia's,Human Anatomy Regional and Applied Dissection and Clinical,CBS publishers & Distributors ,fourth Edition ,2009,pg no- 578.

57.Helly,Haris,Ruddy, Text book of Rheumatology, Vol- I,W.B Saunder company,1997,Pg no -440.

58.Garfin SR,Rydevik BL,Brown RA.Compressive Neuropathy of Spinal Nerve roots.Spine 1991;16: 162-66.

59.Foley K, Smith MM ,Microendoscopic disectomy,Tech Neurosurg ,International Edition,1997,3:301-307

60.Jean –Jacques Abitol,MD,Text book Orthopedic Surgery leading cause of Sciatica South Aaian Edition, 2010; pg no-556-68.

61.M.R .Agur, Aruther F.Dally, Text book of Grants Atals of Anatomy ;Thirteenth Edition,South Asian Edition,2013,396-99.

62.Richard S.Snell,M.D,ph.D Clinical Neuro Anatomy for Medical students,Third Edition,W.B Saunders company ,2014; pg no-440.

63. R.Alagappa, MD, FICP, Manual of Practical Medicine, Jaypee Brothers Medical Publishers(p) Ltd, New Delhi, Fifth Edition 2014,pg no-851.

64.Grahan Doughlar,Fiona Nicol, Machleod's Clinical Examination,13th Edition,2013,pg no-332-335.

65.Van Tulder MW,Koes B,Seitsalo S, Malmivaara A Out come of invasive treatment modalities on back pain and Sciatica :an evidence –based review. Eur Spine J 2006;15: Pg no-82-92.

66.M.Vadivelu ,Virama Munivar Aruliya Nasakaandha Venba, L.Chindamani, manickavel ltd,1926,pg no-33-34

67. Dr.R.Thiyagarajan L.I.M, Gunapadam Thathu seeva vaguppu, Indian Medicine and Homeopathy, Sixth Edition 2006, Pg -90.

68. Dr.R.Thiyagarajan L.I.M, Siddha Materia Medica Minerals&Animal Sections, Indian Medicine and Homeopathy, First Edition 2008, Pg -71-72..

69. K.S. Murugesa Mudhaliyar, Gunapadam- Mooligai Vaguppu, Indian Medicine and Homeopathy, Second Edition 2006, Pg.715.

70. Dr.R.Thiyagarajan L.I.M, Gunapadam Thathu seeva vaguppu, Indian Medicine and Homeopathy , Sixth Edition 2006, Pg -129.

71 .Dr.R.Thiyagarajan L.I.M, Siddha Materia Medica Minerals&Animal Sections, Indian Medicine and Homeopathy, First Edition 2008, Pg -107-109.

72. K.S. Murugesa Mudhaliyar, Gunapadam- Mooligai Vaguppu, Indian Medicine and Homeopathy, Second Edition 2006, Pg.228.

73.Kirtikar & Basu ,Indian medicinal plants ,Part –I,Apprya Krishna Bose printed,1918 pg no-36.

74. K.S. Murugesa Mudha liyar, Gunapadam- Mooligai Vaguppu, Indian Medicine and Homeopathy, Second Edition 2006, Pg.22

75.OECD Guideline for testing of Chemicals (2001) Guideline 423: Acute Oral Toxicity-Acute Toxic Class Method.

76.OECD Guide lines 407 for testing of chemicals. Repeated dose 28-Day Oral Toxicity Study in Rodents. 2008: pp 2- 8.

77.Jain N, Sharma P, Sharma N, Joshi S C. Haemato-biochemical profile following sub acute toxicity of malathion in male albino rats. Pharmacologyonline. 2009; 2:500–506.

78.Suvarna, S.K., C.Layton and J.D. Bancroft. 2013. Bancroft's theory and practice of histological techniques. 7th edn, Churchill Livingstone, London.